

**March 12, 2021**

**ADDENDUM NO. 02**

**PROJECT NUMBER 1110061R  
WATER REUSE – EFFLUENT PUMP BACK  
DUNDEE FISH HATCHERY**

**NOTICE TO ALL BIDDERS:**

This addendum shall be considered part of the Bid Documents and is issued to change, amplify, or delete from or otherwise explain the documents where provisions of this addendum differ from those of the original contract documents. This addendum shall have precedence over the original bid documents and shall govern.

Bidders are hereby notified that they shall incorporate this addendum in their bid, and it shall be construed that the Contractor's bid shall reflect with full knowledge, all items, changes and modifications to the bid documents herein specified.

Bidders are advised to check for updates, addenda issuance, and bid opening date changes at the TPWD Infrastructure Division Website:

[http://www.tpwd.state.tx.us/business/bidops/current\\_bid\\_opportunities/construction/](http://www.tpwd.state.tx.us/business/bidops/current_bid_opportunities/construction/)

**Please see attached revisions to clarify the specifications and drawings.**

**1. SPECIFICATIONS (REISSUED SHEETS WITH MODIFICATIONS)**

**SECTION 05530 – ALUMINUM GRATING**

**SECTION 11311 – SUBMERSIBLE PUMPS**

**2. DRAWINGS (REISSUED SHEETS WITH MODIFICATIONS)**

**Sheet G-02 (2 of 70) – GENERAL ABBREVIATIONS, SYMBOLS &  
DRAWING LEGEND**

**Sheet G-03 (3 of 70) – TAG Table Index 1 of 3**

**Sheet G-04 (4 of 70) – TAG Table Index 2 of 3**

**Sheet G-05 (5 of 70) – TAG Table Index 3 of 3**

**Sheet C-15 (21 of 70) – Yard Piping Details**

**Sheet C-16 (22 of 70) – Force Main Discharge Details Sheet 1 of 3**

**Sheet C-17 (23 of 70) – Force Main Discharge Details Sheet 2 of 3**

**Sheet C-17A (23A of 70) – Add Alt 2 Force Main Discharge Details**

**Sheet S-06 – LIFT STATION SECTIONS & DETAILS I**

**Sheet S-07 – LIFT STATION SECTIONS & DETAILS II**

**Sheet S-15 – TYPICAL STRUCTURAL DETAILS V**

**Sheet S-16 – TYPICAL STRUCTURAL DETAILS VI**

**Sheet S-17 (46 of 70) – VALVE SUPPORT STRUCTURAL DETAILS**

**Sheet M-01 (47 of 70) – WET WELL INDEX AND PLAN VIEW**

**Sheet M-02 (48 of 70) – WET WELL SECTION A**

**Sheet M-05 (51 of 70) – WET WELL SECTION D AND E**

### **3. QUESTIONS WITH ANSWERS:**

**Q:** I have a question about the acceptable pump manufactures for the list station on the project listed above. There are several listed at accepted, but it does not state or equal. Are the manufactures listed the only acceptable brands or can we use an or equal?

**A:** Approved equals are acceptable with contractor to submit documentation for BGE approval.

**Q:** How frequent and what distance requirements would density testing be required for this project? This is important to know so we know how much trenching can be opened up at one time due to the high probability of ground water.

**A:** The distance required for the density testing is 1 density test per 150 ft per lift.

**Q:** Borings B-1 and B-2 indicate groundwater at 7'-0" and 3'-0" respectively. Densities may not be achievable where continuous water seepage has occurred. How will TPWD or engineer handle this as it is anticipated that existing saturated material will be used for backfill for all areas except where Berms (per C-08) require import?

**A:** For pipe installation in areas represented by borings B-1 and B-2, see sheet C-15 detail 1. For structure installation in areas represented by borings B-1 and B-2, see Subgrade Preparation Notes on sheet S-05.

**Q:** The Staging Area on Sheet C-03 is not large enough to support this project. An extensive storage area for bedding material, pipe, berm material, etc. will be required to be stored near the site to accommodate schedule. Are there other areas that could be used for storage. There appears to be an area with an existing gate that allows for better access, logistics to allow large trucks to turnaround, and staging (See attached). This area can be restored after use, but provides access to the site from an alternate direction and a better means for emergency access and egress?

**A:** See note 4 under Construction Notes on sheet C-03.

**Q:** The roads on top of the fish pond levees adjacent to the work area will be a necessity to complete the construction proposed on this project due to lack of access up and down the gravity fed area. There is a significant grade that is extremely steep which may prevent empty trucks from getting up the road between the toll road and pump station. The condition between the toll road and the gravel road near the dam is not suitable for all construction traffic, even with improvement as grade of the road adjacent to the dam is the issue. This is not shown on the drawings. Please verify that the hatchery roads could be used for access to accommodate some trucks, cranes, etc. as there is not a turnaround for heavy construction traffic near the pump station. Roads around hatchery ponds could be improved after use. Constructability without use of these roads in unstable soils is not ideal. Please advise if these can be used to ensure the project can be constructed.

**A:** See note 3 under Construction Notes on sheet C-03.

**Q:** If the manholes are being constructed, do the manholes have to be in monolithic pours or can these be supplied in sections since protective coatings are called out. Please advise if manholes can be provided in sections. There is very limited access for setting these manholes.

**A:** Manholes to be monolithic pours as shown on detail 2 of sheet C-15.

**Q:** Would fiberglass manholes be accepted as an substitute for concrete manholes?

**A:** Fiberglass manholes would not be accepted as a substitute for concrete manholes.

**Q:** Would boring be an acceptable practice to install 24" gravity feed in lieu of excavation and laying pipe in trench. Due to significant water in the area, access, logistics, etc. this would be a potential viable solution to install the pipe. The pump station pit could be used a the boring hole.

**A:** 18" to be installed; Boring is be an acceptable practice if contractor is able to maintain alignment and grade. Contractor would need to submit boring plan for design engineer review that ensures that alignment and grade can be met and showing location of bore pits.

**Q:** Currently, the site does not appear to have overhead electrical service as indicated on E-07 and E-08. What is the timeline for this service to be installed? How long will it take for this service to commence once TPWD orders this to commence from the electrical utility?

**A:** Currently, TPWD anticipates service to be connected within 2 months from when the request is submitted to the provider; power should be available prior to the end of July 2021. Contractor to be responsible for coordination and costs related to temporary power – including usage. When appropriate (contractor notification that all new electrical work is in place), TPWD will coordinate connection of permanent power and transfer of billing with the provider.

**Q:** We have the following question regarding 12-inch discharge pipe penetrations through the Lift Station 2-inch aluminum grating (Sheet No. S-05 (34). Mechanical drawings (M-01 (47) thru M-03 (49) indicate there is now only 1 pump located within the Lift Station. Normally, pipe penetrations require banded, split grating panels and maybe additional grating supports depending upon pipe opening requirement. If openings are required, we will have to provide a no-tripping closure or cover over the openings. Please advise.

**A:** Yes, please provide openings and non-tripping closures over the openings.

**Q:** Are there any timelines where work will not be allowed due to Migratory Birds?

**A:** See Natural Resources Clearance Memorandum dated August 7, 2019 attached.

**Q:** Drawing page S-05 calls for a removable grating to cover the pump, however spec section 11311 2.03.A states an access hatch is to be supplied. Can you please clarify which is to be supplied?

**A:** Specification section 11311 2.03 has been edited to reference the relevant specification. Additionally, sheet S-15 has been updated to include this reference as well.

**Q:** Regarding Base Bid/18" Gravity Line 001 (GL1), Base Bid/16" Force Main 001 (FM1), and Alternate Bid/18" Gravity Line 001 (AT1), per the Pipe Tag Number Schedule (Plan Sheets G-03 & G-04), and per Specification Sections 15064 and 15065, please clarify and confirm that the two acceptable pipe materials for the 18" Gravity Line and 16" Force Main are either Fusible PVC or Certalok.

**A:** The two acceptable materials for the 18" Gravity Line and 16" Force Main are either Fusible PVC or Certalok.



**BIDDERS SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE  
SPACE PROVIDED ON THE CONTRACTOR'S BID FORM.**

**WARNING: BIDDER'S FAILURE TO ACKNOWLEDGE RECEIPT OF  
ADDENDA MAY RESULT IN REJECTION OF BID.**

*End of Addendum Number 02*

Sincerely,

MICHAEL POLEND0, CTC0 CTCM  
Contract Manager, Infrastructure Division

SECTION 05530  
ALUMINUM GRATING

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install aluminum grating and frames.
2. The Work includes:
  - a. Providing grating, frames, and appurtenances.
  - b. Providing openings in aluminum grating to accommodate the Work under this and other Sections, and attaching to aluminum grating all items such as sleeves, bands, studs, fasteners, and items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before aluminum grating Work.

C. Related Sections:

1. Section 05500, Miscellaneous Metal Fabrications.
2. Section 09900, Paints and Painting.
3. Section 09901, Protective Coatings.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AA Aluminum Design Manual.
2. ASTM B210, Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
3. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
4. NAAMM MBG 531, Metal Bar Grating Manual.
5. NAAMM MBG 533, Welding Specifications for Fabrication of Steel, Aluminum and Stainless Steel Bar Grating.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have at least five years experience manufacturing products substantially similar to those required and shall be able to submit documentation of at least five installations in satisfactory operation for at least five years each.

**B. Component Supply and Compatibility:**

1. Obtain all products and materials included in this Section regardless of component manufacturer from a single aluminum-grating manufacturer.
2. Aluminum grating manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all products and materials furnished under this Section.
3. Components shall be suitable for the specified service conditions and be integrated into overall assembly by aluminum grating manufacturer.
4. Provide only one type of aluminum grating exclusively throughout the Project.

**1.04 SUBMITTALS**

**A. Action Submittals: Submit the following:**

1. Shop Drawings:
  - a. Fabrication and erection of all Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.
  - b. Setting drawings and templates for location and installation of anchorage devices.
2. Product Data:
  - a. Manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions.

**1.05 DELIVERY, STORAGE, AND HANDLING**

**A. Shipping, Handling and Unloading:**

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices to be embedded in cast-in-place concrete in ample time to prevent delaying the Work.

**B. Storage and Protection:**

1. Protect materials from corrosion and deterioration.
2. Do not store materials in contact with concrete or other materials that might cause corrosion, staining, scratching, or damage materials or finish.

## **PART 2 PRODUCTS**

### **2.01 SYSTEM PERFORMANCE**

- A. Aluminum Grating: Provide aluminum grating complying with the following:
1. Grating Design Loads: Uniform live load shall be as shown or indicated in the Contract Documents. Where live load is not shown or indicated, uniform live and concentrated loads shall be as indicated below, whichever results in the greater design stresses.
    - a. Live Load: 100 psf; Concentrated Load: 500 lbs per foot of grating width at center span.
  2. Maximum Clear Span Deflection for Uniform Live Loads: 1/120 of span, but not more than 1/4-inch.
  3. Maximum Fiber Stress: 12,000 psi.
  4. Do not install aluminum grating in areas subject to vehicular traffic.
  5. Minimum Size of Members:
    - a. Minimum size of bearing bars shall be within standard mill tolerance as indicated in load tables in NAAMM MBG 531 for applicable loading and deflection requirements.
    - b. Minimum dimensions of cross bars shall be as indicated in tables of Minimum Standard Cross Bars and Connecting Bars in NAAMM MBG 531.
  6. Banding bar shall be 1/4-inch thick minimum. Top of banding bar shall be flush with top of grating, unless otherwise shown or indicated. Banding bar shall be 1/4-inch shorter than the bearing bar height.
  7. Comply with requirements of AA Aluminum Design Manual.

### **2.02 MANUFACTURERS**

- A. Grating, Products and Manufacturers: Provide one of the following:
1. Swage-Locked I-Bar Grating, by IKG Industries.
  2. Swage-Locked I-Bar Grating, by AMICO.
  3. Swage-Locked I-Bar Grating, by Ohio Gratings.
  4. Or equal.

**2.03 MATERIALS**

- A. Bearing Bars: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with ASTM B221.
- B. Cross Bars or Bent Connecting Bars: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with either ASTM B221 or ASTM B210.
- C. Frames: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with ASTM B221.
- D. Stud anchors welded to steel supports and other fasteners shall be Type 316 stainless steel.

**2.04 FABRICATION**

- A. Use materials of minimum depth and thickness specified and required to comply with performance criteria in the Contract Documents.
- B. Provide grating as follows:
  - 1. Grating Type: Aluminum I-bar with swage-locked cross bars at right angles to bearing bars.
  - 2. Depth: Two-inch minimum.
  - 3. Bearing Bars: Aluminum I-bar minimum of one-inch spaced at 1-3/16-inch on centers.
  - 4. Cross-Bars: Swage-locked to bearing bars at maximum spacing of four inches on centers.
  - 5. Surface: Grooved.
  - 6. Finish: Mill.
- C. Provide cutouts in grating for passage of piping, electrical conduit, valve stems, columns, ducts, and similar work. Where more than two bearings bars are included in a cut out, provide banding bars of same dimensions as bearing bars around opening welded to grating component parts.
- D. Gratings shall be accurately fabricated, free from warps, twists, and other defects that would affect grating appearance and grating serviceability.
- E. Welding shall conform to requirements of NAAMM MBG 533. Welds shall be ground smooth at top surfaces and bearing surfaces.
- F. Openings in and edges of gratings sections shall be banded with banding bars. Weld bands to intersecting members.

- G. Size each section of grating to weigh not more than 100 pounds, unless otherwise indicated in the Contract Documents.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine conditions under which Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Check all dimensions at the Site after piping and equipment are in place and determine exact locations of openings and cutouts.

### **3.02 INSTALLATION**

- A. Fastening to In-Place Construction:
  - 1. Use anchorage devices and fasteners to secure aluminum grating to supporting members or prepared openings, as recommended by manufacturer.
  - 2. Weld Type 316 stainless steel stud bolts to receive saddle clip or flange block anchors to supporting steel members. Drill for machine bolts when supports are aluminum.
- B. Cutting, Fitting, and Placing:
  - 1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment and elevation, plumb, level, true, and free of rack. Do not use wedges or shimming devices.
  - 2. Where gratings are penetrated by piping, electrical conduit, ducts, structural members, or similar protrusions, cut openings neatly and accurately to size and attach banding bar as specified.
  - 3. Divide panels into sections only to extent required for installation where aluminum grating is to be installed around previously installed piping, electrical conduit, ducts, structural members, or similar protrusions.
- C. Aluminum gratings in concrete floors shall be removable and arranged in sizes to be readily lifted. Provide aluminum gratings in concrete with aluminum angle frames with mitered corners and welded joints. Grind exposed joints smooth. Frames shall have welded anchors set into concrete. Angle size shall match grating depth selected for flush fit.
- D. Clearance at ends or between sections of grating shall be a maximum of 1/4-inch.
- E. Tops of aluminum gratings shall be set flush with surrounding construction.

- F. Aluminum gratings shall be set with full and uniform end bearing on frames to preclude rocking movement; do not use wedges or similar shimming devices.
- G. Protection of Aluminum from Dissimilar Materials: Coat aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel, or other metals, in accordance with Section 05500, Miscellaneous Metal Fabrications, Section 09900, Paints and Painting and Section 09901, Protective Coatings.

END OF SECTION



SECTION 11311  
SUBMERSIBLE PUMPS

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Placing into operation 1 submersible pump, with discharge connections, lifting chains and guide bars as specified herein and as indicated on the drawings. The pump station shall be complete and operational with motors and accessories as shown on the plans and as specified:
  - 1. Review installation procedures under other Sections and coordinate with the Work related to this Section.
  - 2. Coordinate pumps and motors with electrical work as specified in Division 16, Electrical.

**1.02 MEASUREMENT AND PAYMENT**

- A. No separate payment will be made for work required under this section. Contractor will include all costs of the requirements of this section in the appropriate bid item(s) on the bid form.

**1.03 REFERENCES**

- A. Reference Standards: Comply as a minimum with applicable provisions and recommendations of the following:
  - 1. American National Standards Institute (ANSI)
    - a. B16.1: Standard for Cast Iron Pipe Flanges and Flanged Fittings, 125 lb.
  - 2. American Society for Testing and Materials (ASTM)
    - a. A 48: Standard Specification for Gray Iron Castings.
    - b. A743: Standard Specification Iron-Chromium Nickel, Corrosion Resistant,
  - 3. Anti-Friction Bearing Manufacturers Association (AFBMA)
  - 4. Hydraulic Institute.
    - a. HI 14.6: Hydrodynamic Pumps for Hydraulic Performance Acceptance Tests.
    - b. HI 11.6: Submersible Pump Tests
  - 5. Institute of Electrical and Electronic Engineers (IEEE)
  - 6. National Electric Code (NEC)
  - 7. National Electrical Manufacturers Association (NEMA)

8. Steel Structures Painting Council (SSPC)

1.04 PERFORMANCE REQUIREMENTS

- A. Furnish and install the submersible, non-clog pumps capable of handling unscreened surface water with solids in accordance with these Specifications and as shown on the Drawings.
- B. Number of pumps, minimum and maximum operating capacities, TDH, and other pump design data are tabulated on the Drawings.
- C. Pumps shall be designed for continuous operation without cavitation within the specified operating range. The pump shall have a minimum hydraulic efficiency of 77 percent at the rated capacity. The NPSHR at the maximum operating capacity shall not exceed 26 feet. The pump shall have a performance identical to the Base Bid Pump Characteristics, and Base Bid Pump Performance and System Curve shown on sheet M-02 of the Final Re-Bid plan set.

1.05 SUBMITTALS

- A. Submit a list of not less than 5 installations where pumping equipment of the type and approximate size specified has been in successful operation for at least 5 years.
- B. Standard submittal data for approval must consist of:
  - 1. Pump Performance Curves.
  - 2. Pump Outline Drawing.
  - 3. Station Drawing for Accessories.
  - 4. Electrical Motor Data.
  - 5. Typical Installation Guides.
  - 6. Technical Manuals and Parts List.
  - 8. Printed Warranty.
  - 9. Management system certificate ISO 9001.
  - 10. Manufacturer's Equipment Storage Recommendations.
  - 11. Manufacturer's Standard Recommended Start-Up Report Form.
- C. Submit locations of the nearest permanent service headquarters of the pump and motor manufacturer for the size of pump and motor submitted.
- D. Submit descriptive literature, including a cross-sectional view of each pump and motor combination, which indicates materials of construction, weights, principal dimensions, and other important details. Submit dimensioned, to-scale drawings showing placement of pumps, base ells, rail, rail mountings, and access frame and cover. Submit Shop Drawings for access frame and cover
- E. Submit certified characteristic curves showing the head-capacity relationship, brake horsepower, NPSH requirements, pump efficiency (ratio of the water horsepower to brake horsepower) and pump speed. The curves shall be complete for the entire range of operation from shutoff to minimum head

conditions. Where pumps are to be used in VFD service, submit curves showing performance at 100% of rated speed and at decreasing speeds that would be expected. Label curves in terms of rpm and Hz. Indicate the minimum rpm, Hz, and gpm for the pump under the conditions shown on the drawings. Submit manufacturer's calculation of radial and thrust bearing L-10 life at the design head and flow indicated on the Drawings.

F. If the proposed pumping equipment is supplied with electrical equipment and components of larger capacity than specified or shown on the Contract Drawings, the shop drawings for the equipment listed in the following Sections shall be submitted in the same package as the shop drawings submitted for this Section.

G. Manufacturer's Certifications:

1. Submit manufacturer's certification that he has carefully examined the Contract Documents in detail, including the arrangement and conditions of proposed electrical, mechanical 3 water level settings and structural systems affecting the performance of the pumping equipment units, and the detailed requirements of manufacturing and subsequent installation of the pumping equipment units.
2. Submit manufacturer's certification that there are no omissions, ambiguities or conflicts in the Contract Documents or in the pumping station piping layout that affects the pumping unit, as shown on the Drawings, which have not already been clarified in writing.
3. Submit manufacturer's certification that the running amperes of the motor will not exceed the nameplate rating of the motor under all expected operating conditions. Submit motor manufacturer's maximum allowed KVAR.
4. Submit manufacturer's certification that spare parts, seals, bearings, O-rings and power cable shall be available locally for models to be supplied.
5. Submit manufacturer's certification that motors are explosion proof and labeled so, approved by Underwriters Laboratories (UL) or Factory Mutual (FM).

H. Factory Tests: Submit 3 copies of certified test reports to the Engineer for review.

1. The pump manufacturer shall perform the following inspections and tests on each pump before shipment:
  - a. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.
  - b. A motor and cable insulation test for moisture content or insulation defects shall be made.
  - c. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
  - d. Each pump shall be run submerged in water.

- e. After running pump submerged in water, retest motor and cable insulation.
  - 2. If tests do not meet performance specifications, Contractor shall correct deficiencies to provide the specified performance.
  - 3. A written report stating the foregoing steps have been done must be supplied with each pump at the time of shipment. This report must be approved by the Engineer prior to payment.
- I. Maximum Allowable Distance Data: Where pumps will be in VFD service (remotely located), submit maximum allowable installation distance data for motor and VFD drives.

#### 1.06 QUALITY ASSURANCE

- A. All materials used shall be new, of high grade, and with properties best suited to the work required.
- B. Manufacturer's Qualifications:
- 1. Pumping equipment provided under this Section shall be a standard product in regular production by manufacturers with 20 or more years of experience whose products have proven reliable in at least 5 similar services for at least 5 years each.
  - 2. Manufacturer shall satisfy the Engineer that it is capable of the following:
    - a. Providing factory trained personnel to service the pumps and allied equipment when needed within a 48-hour period.
    - b. Providing all needed spare parts for the pumps within a 48-hour period.
  - 3. Provide a written manufacturer's certification that spare parts, seals, bearings, O-rings and power cable shall be available locally for models to be supplied.
- C. Coordination Responsibility:
- 1. In order to ensure equipment compatibility, one manufacturer shall be responsible for providing all submersible pumping equipment, including pump and motor, access frame and guides.
  - 2. The Contractor shall name a pump manufacturer, who will have responsibility for the function of the complete system in accordance with the intent of these Specifications. The named manufacturer shall be experienced in similar work.
  - 3. Contractor shall retain overall responsibility for equipment coordination, installation, testing and operation.
- D. Substitution: The engineering design is based on a certain manufacturer's equipment. If the Contractor's choice of equipment is approved but requires

modifications to plant, equipment or piping for installation, the Contractor is responsible for submitting revised engineering design and drawings to make the proposed equipment compatible with the project, at no additional cost to the Owner.

**1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver equipment to site, and store and protect off the ground in enclosed shelter.
- B. The pump cable end shall be sealed with a high-quality protective covering to make it impervious to moisture or water seepage from submersion or other causes prior to electrical installation.

**1.08 EVALUATION AND SELECTION**

- A. The Owner reserves the right to select any equipment, which is deemed to be in its best interest.

**1.09 WARRANTY**

- A. Pump manufacturer shall furnish to the Owner a warranty written expressly from the manufacturer to the Owner, covering workmanship and material for 5 years or 10,000 hours of operation under normal use and service. The warranty shall cover 100 percent of parts and labor for at least one full year. The warranty period shall commence on the day of Final
- B. Acceptance. Warranty shall be in printed form and previously published as the manufacturer's Standard Warranty for all similar units manufactured. Pumps repaired under warranty will be returned to the job site freight pre-paid.

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Through shop drawing submittals, the following named manufacturers or equal will be considered, provided the submitted equipment meets the specified requirements and system operating conditions:
  - 1. Fairbanks-Morse
  - 2. Ebara
  - 3. KSB
  - 4. Xylem
  - 5. Flow Serve
  - 6. Grundfos
- B. Listing as an acceptable manufacturer will not relieve the manufacturer from conforming to Contract Specifications.

**2.02 PUMP CONSTRUCTION**

A. The Materials of construction shall be as follows (or equal materials will be considered) :

1. Pump housing: ASTM A-48, Class 35B
2. Impeller and insert ring: A 532 ALLOY III A (25% Chrome)
3. Cooling jacket: Stainless steel AISI 316
4. Stator housing: ASTM A-48, Class 35B
5. Shaft: ASTM A479 S43100-T.
6. Shaft seal: Pump side: - Corrosion resistant Tungsten carbide WCCR
7. Shaft seal Motor side: - Corrosion resistant Tungsten carbide WCCR

B. Casing:

1. Major pump components shall be of fine-grained gray cast iron, ASTM A48, Class 30 or better, with smooth surfaces devoid of blow holes and other irregularities. Surfaces coming into contact with water containing solids or long-fibered material, other than stainless steel shall be protected by an approved resistant coating.
2. Mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber O-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces. This will result in controlled compression of nitrile rubber O-rings without the requirement of a specific torque limit. No secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease or other devices shall be used.
3. Pump suction flange shall be drilled to ANSI standard, class 125.

C. Power Cable:

1. The cable entry water seal design shall preclude specific torque requirements to ensure a watertight and submersible seal. The cable entry shall be sealed by an elastomer grommet, epoxy potting material, or a combination of both. The cable entry sealing system shall provide strain relief for the terminal connections and allow access to the terminal connections without adversely affecting the integrity or function of the seal system.
2. Cables shall be oil, grease and abrasion resistant, and meet applicable standards. The outer jacket shall be polyurethane or other material equally suitable for immersion in unclean water.
3. Cables shall be capable of operating on either 230 volt or 460-volt, 3 phase service and under continuous submergence without loss of watertight integrity to a depth of 65 feet.
4. No parallel power cables are acceptable unless they are size #1/0 or larger.
5. Motors 7.5 HP and over shall have reconnectable terminal blocks. All leads shall be numbered.

**D. Submersible Motor:**

1. The pump motor shall be a NEMA Design B squirrel-cage, induction, shell type design, housed in an oil-filled or air-filled watertight chamber. The stator winding and stator leads shall be insulated with moisture resistant Class F insulation which will resist a temperature of 155 degrees C (311 degrees F). The use of bolts, pins or other fastening devices requiring penetration of the stator housing shall be rejected. The rotor bars and short circuit rings shall be of aluminum. The motor shall be designed for continuous duty, capable of sustaining a minimum of 15 starts per hour, evenly spaced. The pump/motor shall be capable of operating at liquid temperature of 104 degrees F per FM requirements-without overheating or operating in the service factor. Motor shall be non-overloading over the entire range of the operating curve within the nameplate HP. A performance chart shall be provided showing curves for torque, current, a minimum service factor of 1.15, input/output kw and efficiency.
  2. The motor shall be UL listed or FM approved as explosion-proof, suitable for NEC Class I, Division 1, Group C and D environments.
  3. Each unit shall be provided with an adequately designed cooling system totally self-contained with no external mechanical devices. Pumps shall be designed to operate continuously with the fluid level at the top of the pump volute.
  4. Maximum motor speed shall be 1760 rpm for pumps with discharge diameter greater than or equal to 6-inches.
  5. For sizes 20 HP and smaller, the motor shall be equipped with dual voltage connections for 230/460 volts.
  6. Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with 3 thermal switches, embedded in the end coils of the stator winding (one switch in each stator phase). These shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.
  7. For motor sizes larger than 100 HP, an independent thermal switch shall be included to monitor the lower motor bearing temperature.
  8. The pump shall be equipped with moisture sensors in the oil-filled seal chamber to indicate seal leakage. Motors larger than 20 HP shall be equipped with a leakage sensor to detect water in the stator chamber.
- E. Shaft: Each pump shaft shall be one piece of AISI type 420 stainless steel, or heat-treated carbon steel C 1035 protected by a stainless-steel shaft sleeve. The shaft shall be of sufficient diameter to assure rigid support of the impeller and to prevent excessive vibration at all speeds.
- F. Pump Seal: Each pump shall be provided with a tandem mechanical shaft seal system. The upper seal of the tandem set of seals shall operate in an oil chamber located just below the stator housing. This set shall contain one stationary tungsten-carbide ring and one positively driven rotating carbon (or better) ring, and functions as an independent secondary barrier between the pumped liquid and the stator housing. The lower seal of the tandem set of seals

functions as the primary barrier between the pumped liquid and the oil housing. This set shall consist of a stationary ring and a positively driven rotating ring, both of which shall be silicon carbide or tungsten carbide. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring action between upper and lower seal faces shall not be acceptable.

G. Bearings: Bearings shall be permanently lubricated ball or roller type rated in accordance with AFBMA for an L-10 duty life of at least 50,000 hours at the rated capacity.

H. Impeller:

1. The impeller shall be wear resistant and made of high chromium cast iron with at least 24% chrome against sand and grit which is expected to enter the pump station with the sewage or the storm water. Impellers that have surface hardening (by thermal, coating, etc.) will not be allowed. The impeller shall be dynamically or statically balanced, double shrouded non-clogging design having a long thrulet without acute turns. The impeller shall be capable of handling 3-inch minimum diameter solids, fibrous materials, heavy sludge and other matter found in normal sewage application. The impeller hub shall be accurately fitted and mechanically secured to the motor shaft.
2. The volute shall be of a single piece, concentric or non-concentric design, and shall have smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller. The volute bottom shall be of a suction bell design for pumps with 12-inch discharge and larger.
3. A replaceable wear ring shall be installed to provide efficient sealing between the volute and impeller. The wear rings shall consist of A 532 Alloy III A (25% Chrome). For pumps 10 HP and below the pump shall be equipped with brass or nitrile rubber volute wear ring only.

## 2.03 ACCESSORIES

A. Access Frames and Covers:

1. See Specification Section 05530 for pump station aluminum grating cover shown on sheet S-05.

B. Pump Guide System: Pump manufacturer shall provide a guide rail system complying with the following requirements:

1. Type 316 stainless steel rails, replaceable without man entry into the wet well.
2. Lower bracket integral with pump support/discharge fitting.
3. Type 316 stainless steel upper bracket bolted to access cover frame.
4. Intermediate brackets as shown on the Drawings, if required.



C. Bolts, Studs and Nuts:

1. All bolts, studs and nuts shall have American National form right-hand machine cut threads which shall be in conformity with the current ANSI B1.1, "Screw Threads", Coarse Thread Series, unless otherwise specified.
2. Bolt heads and nuts shall be semi-finished and shall be in conformity with ANSI B18.2, "Wrench-Head Bolts and Nuts and Wrench Openings", Heavy Series, unless otherwise specified. All nuts shall be hexagonal in shape.
3. Anchor bolts, flange bolts, studs and nuts shall be Type 316 stainless steel in conformity with ASTM A276.

2.04 PUMP PROTECTION SYSTEM

- A. Manufacturer shall furnish a complete pump monitoring and protection system consisting of an intrinsically safe solid-state monitoring system to be installed in the motor starter cubicle, and independent probes integral to the pump/motor wired to a sealed cable entry terminal box for connection of submersible control cables.
- B. Monitoring unit shall be solid state, intrinsically safe system designed for mounting within the motor starter cubicle. Monitoring system shall accept inputs from the sensors specified and shall output independent contacts which close to alarm each condition, or separate independent output terminals suitable for direct connection to interposing relays for alarm contact development. Provide a separate N.C. alarm contact, rated at 120V, 5A inductive, which opens on any failure. Monitor system shall be suitable for operation from a 24VAC unregulated, unlimited power supply. Provide any additional equipment or appurtenances required to provide current and voltage limited intrinsically safe installation as specified. The monitoring system shall accept separate isolated N.O. contacts, which close to indicate pump running and to reset after pump trip.
- C. Sensors shall be independently wired to the monitoring system. Provisions for the following sensors for each pump:
  1. Stator leak (one required).
  2. Bearing temperature for pumps over 100 HP. (one required)
  3. Stator temperature (one per phase, field test and connect to highest reading obtained)

2.05 SHOP PAINTING

- A. Pump motor size up to 100 HP:
  1. Pump Exterior:
    - a. Pre-treatment.
    - b. Primer: One coat of alkyd resin primer, 1.6 mils minimum.

- c. Finish: Chloric rubber paint, 2.4 mils minimum.
  - 2. Machine Finished Surfaces:
    - a. Machined parts are cleaned to remove all dirt and grease.
    - b. Cleaning is done so as not to affect primer or deteriorate adherence to finish paint.
    - c. Storage and transport are carried out in such a way that rust attack on machined surfaces does not occur.
    - d. At assembly, surfaces are coated with a corrosion preventive paint.
- B. Pump motor size greater than 100 HP:
- 1. Pump Exterior:
    - a. Pre-treatment: Sandblast cleaning and removal of all oil and dust.
    - b. Primer: One coat of alkyd resin primer, 1.6 mils minimum.
    - c. Finish coat: Two coats of chloric rubber paint, 2.1 mils each coat.
  - 2. Machine finished surfaces:
    - a. Machined parts are cleaned to remove all dirt and grease.
    - b. Cleaning is done so as not to affect primer or deteriorate adherence to finish paint.
    - c. Storage and transport are carried out in such a way that rust-attack on machined surfaces does not occur.
    - d. At assembly, surfaces are coated with a corrosion preventive paint.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Installation of the pumping equipment shall conform to the manufacturer's instructions and recommendations and reviewed shop drawings.
- B. Field Tests:
  - 1. Each pump will be subjected to a 6-hour field operational test before acceptance as follows:
    - a. After installation, a pump station start-up shall be performed by the installing contractor under the supervision of the manufacturer's authorized representative. 16 hours of field service shall be provided by an authorized, factory trained representative of the pump manufacturer. Services shall include, but not be limited to, inspection of the completed pump station installation to ensure that it has been performed in accordance with the manufacturer's instructions and recommendations, supervision of all field-testing and activation of the Pump Manufacturer's Warranty. The test shall demonstrate to the

satisfaction of the Owner that the equipment meets all specified performance criteria, is properly installed and anchored, and operates smoothly without exceeding the full load amperage rating of the motor. The Contractor shall be responsible for coordinating the required field services with the Pump Manufacturer.

- b. The unit under test shall be properly installed in the wet well, firmly upon its discharge connection after determination of (a) proper service voltage is being supplied and (b) proper rotation of the impeller. No cooling by forced or circulated air shall be allowed.
  - c. Capacity Test: On four occasions, wet well shall be filled with liquid to an elevation sufficient to allow each single pump to operate for 3 minutes, independent of the control regime. Time required to pump down known volume shall be measured as evidence of each pump's capacity. All portions of the force main must have been constructed and tested prior to this test.
  - d. Snore Tests: Snore is defined as that state when the pump is alternately pumping liquid and air and usually occurs when the pump pumps the liquid down to expose its inlet. The unit(s) under test shall be submerged with just enough liquid to accomplish "snore" and allowed to run two times for 10 minutes minimum.
- C. Start-up Data: Contractor shall complete and submit the start-up records and maintenance data sheets.

END OF SECTION

## GENERAL NOTES

- CONTRACTOR TO REFERENCE LATEST VERSION OF THE PROJECT MANUAL WHEN REFERENCED IN THIS SET OF PLANS.
- PLANS AND SPECIFICATIONS SHALL NOT BE SUBSTANTIALLY CHANGED WITHOUT EITHER WRITTEN APPROVAL OF THE EXECUTIVE DIRECTOR OF TCEQ BEFORE THE WORK IS STARTED OR NOTIFICATIONS OF CHANGES, AS DEFINED IN 30 TEXAS ADMINISTRATIVE CODE (TAC) CHAPTER 299.26.
- ANY CONTRACTOR / SUBCONTRACTOR PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THEIR OPERATIONS. SAID EXISTING FACILITIES SHALL INCLUDE, BUT NOT BE LIMITED TO EQUIPMENT, PIPING, PAVEMENT STRUCTURES, BERMES, DITCHES, FENCES, AND PLANTS. ANY REMOVAL OR DAMAGE TO EXISTING FACILITIES SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE AND SHALL BE AS APPROVED BY THE OWNER.
- ALL CONSTRUCTION TESTING AND MATERIALS SHALL MEET OR EXCEED ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. SUBMIT INFORMATION AS SPECIFIED.
- ALL UNPAVED DISTURBED/DAMAGED AREAS SHALL BE HYDROMULCH SEEDING AS SPECIFIED IN THE SPECIFICATIONS. ALL DISTURBED/DAMAGED PAVED AREAS SHALL BE REPAVED AS REQUIRED AND AS SPECIFIED.
- AT THE CONTRACTOR'S DISCRETION, INSTALL TEMPORARY 6' HIGH CHAIN LINK FENCE AROUND THE DESIGNATED CONTRACTOR'S STORAGE AREA. CONTRACTOR IS RESPONSIBLE FOR SECURITY ON THE JOBSITE. ALL TEMPORARY FENCES, GATES AND OTHER TEMPORARY FACILITIES SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE OF THE PROJECT. REMOVE CONCRETE FOUNDATIONS FOR POSTS. POST HOLES SHALL BE BACKFILLED, SEEDING AND RESTORED TO ORIGINAL CONDITION.
- EXISTING VALVES, PIPELINES AND STRUCTURES MAY LEAK, OR NOT HOLD AT ALL, IN THE CLOSED POSITION. CONTRACTOR SHALL PROVIDE THE MEANS AND EQUIPMENT NECESSARY TO CONTROL WATER DURING CONSTRUCTION.
- THE CONTRACTOR SHALL COORDINATE OPERATION OF ALL EXISTING VALVES WITH THE OWNER. CONTACT THE ASSIGNED OWNER'S REPRESENTATIVE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING "AS-RECORDED" PLANS TO THE ENGINEER OF RECORD. THIS INFORMATION WILL BE PLACED AND MARKED "AS-RECORDED" BY THE ENGINEER OF RECORD. COPIES OF THESE "AS-RECORDED" PLANS WILL BE FURNISHED TO THE OWNER AS REQUIRED.
- INFORMATION SHOWN ON THE DRAWINGS CONCERNING TYPE, LOCATION, DIMENSIONS, ELEVATIONS AND RELATED INFORMATION OF EXISTING PIPES AND STRUCTURES WAS OBTAINED FROM CONSTRUCTION DRAWINGS OF PREVIOUS PROJECTS FURNISHED BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION OF THE ACTUAL SIZE, LOCATION AND ELEVATION OF EXISTING FACILITIES. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAKING ADJUSTMENTS NECESSARY IN THEIR WORK TO FIT WITHIN THE EXISTING FACILITIES AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN, INSTALLATION, MAINTENANCE, AND REMOVAL AFTER CONSTRUCTION OF ALL TEMPORARY EROSION CONTROL DEVICES TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION AREA.
- FOLLOWING THE COMPLETION OF CONSTRUCTION, ALL AREAS SHALL BE RESTORED TO THEIR ORIGINAL OR BETTER CONDITION.
- THE GEOTECHNICAL INVESTIGATION REPORT AND LOGS OF BORINGS ARE AVAILABLE FOR THE CONTRACTOR'S REVIEW AT THE OFFICE OF THE ENGINEER. THE ACCURACY OR COMPLETENESS IS NOT GUARANTEED. THE CONTRACTOR SHALL PERFORM ADDITIONAL GEOTECHNICAL INVESTIGATION AS DEEMED NECESSARY FOR CONSTRUCTION ACTIVITIES. THERE SHALL NOT BE ANY ADDITIONAL PAYMENT FOR EXTENSIONS OF CONTRACT TIME TO THE CONTRACTOR FOR ADDITIONAL GEOTECHNICAL.
- GROUNDWATER AT THE PROPOSED SITE WILL VARY DEPENDING ON THE SEASONAL VARIATIONS AND SUBSURFACE CONDITIONS. GROUNDWATER LEVELS SHOWN IN THE BORING LOGS ARE ONLY AN INDICATION OF GROUNDWATER LEVELS AT THE TIME OF DRILLING THE BORINGS.
- EXCESS EXCAVATED MATERIAL SHALL BE STORED IN LOCATIONS IDENTIFIED BY TPWD.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED CONSTRUCTION SIGNS AND TRAFFIC CONTROL DEVICES DURING THE CONSTRUCTION OF THE PROJECT. WHEN TRAFFIC CONTROL IS REQUIRED, CONTRACTOR SHALL ADHERE TO THE SPECIFICATION FOR UNIFORM TRAFFIC CONTROL DEVICES. CONTRACTOR SHALL PROVIDE ALL BARRICADES, SAFETY DEVICES, AND TRAFFIC CONTROL, INCLUDING ADEQUATE MEASURES TO PROTECT PEDESTRIAN TRAFFIC ON THE SITE DURING CONSTRUCTION OF THE PROJECT.
- WHERE EXISTING UTILITIES OR LINES ARE CUT, BROKEN OR DAMAGED DUE TO THE CONTRACTOR'S OPERATIONS, THE CONTRACTOR SHALL REPLACE OR REPAIR THE UTILITIES OR LINES WITH THE SAME TYPE OF ORIGINAL MATERIAL AND CONSTRUCTION OR BETTER, UNLESS OTHERWISE SHOWN OR NOTED ON THE PLANS, AT THEIR OWN COST AND EXPENSE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND ENGINEER OF ANY CONFLICTS IN GRADES AND ALIGNMENTS.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO THE START OF WORK AND SHALL NOTIFY THE OWNER AND ENGINEER IN WRITING IF ANY DISCREPANCIES ARE DISCOVERED.
- CONCRETE MANHOLES SHALL BE CONSTRUCTED MONOLITHICALLY PER SPECIFICATION 02081 CAST-IN-PLACE CONCRETE MANHOLES, SECTION 5.02.C.
- DENSITY TESTING OF TRENCH BACKFILL SHALL BE EVERY 500 LINEAR FEET, AND NOT LESS THAN TWO (2) TESTS PER LIFT PER TRENCH. DENSITY TESTING SHOULD BE PERFORMED ON FULL-TIME BASIS DURING BACKFILLING OPERATIONS.
- THE PIPE AND TRENCH WILL NEED TO BE DEWATERED FOR PROPER INSTALLATION. DENSITY TESTING SHOULD BE PERFORMED ON A FULL-TIME BASIS AT THE TIME OF BACKFILLING. DENSITY TESTING WILL BE PERFORMED IN THE DRY.

## EROSION CONTROL NOTES

- CONTRACTOR MUST COMPLETE A CONSTRUCTION SITE NOTICE, OBTAIN SIGNED COPIES OF NOI FORM FOR BOTH OWNER AND CONTRACTOR (IF APPLICABLE FOR THIS SITE), AND POST THEM AT THE CONSTRUCTION SITE, IN ACCORDANCE WITH THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES (TX150000). THE GENERAL CONTRACTOR, (AND ALL SUBCONTRACTORS INVOLVED WITH ANY CONSTRUCTION ACTIVITY RELATED TO EARTHWORK, EROSION CONTROL, ETC., OR WHICH UTILIZE POSSIBLE POLLUTANTS AS DEFINED IN THE TPDES GENERAL PERMIT) MUST BE FAMILIAR WITH THE CONTENTS OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS WELL AS ALL THE REQUIREMENTS SET FORTH IN THE TPDES GENERAL PERMIT AND ANY APPLICABLE LOCAL PERMIT REQUIREMENTS AND SHALL COMPLY WITH ALL SUCH REQUIREMENTS DURING ALL CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR SHALL ADHERE TO THE SEQUENCE OF OPERATIONS FOR EROSION CONTROL IMPLEMENTATION SHOWN HEREIN. ANY DEVIATION FROM THIS SEQUENCE DEEMED NECESSARY BY THE CONTRACTOR MAY REQUIRE THAT THE STORM WATER POLLUTION PREVENTION PLAN BE MODIFIED IN ACCORDANCE WITH THE TPDES GENERAL PERMIT GUIDELINES AND ACTION 1.01 F OF THE STORM WATER POLLUTION PREVENTION PLAN. THE CONTRACTOR SHALL MODIFY THE SWPPP PLAN TO SHOW LOCATIONS OF PORTABLE TOILETS, EQUIPMENT MAINTENANCE/REPAIR AREAS, STOCKPILE AREAS, FUEL STORAGE AREAS, AND POLLUTANT CONTROLS FOR EACH, AS SOON AS POSSIBLE.
- THE GENERAL CONTRACTOR SHALL PERFORM ALL REQUIRED INSPECTIONS OF STORM WATER CONTROL AND PRACTICES AT FREQUENCIES GIVEN IN THE TPDES GENERAL PERMIT, AND SHALL COMPLETE AND SIGN APPROPRIATE INSPECTION FORMS (AS PROVIDED IN THE STORM WATER POLLUTION PREVENTION PLAN).
- OIL AND GREASE ABSORBING MATERIAL SHALL BE READILY AVAILABLE ON-SITE AND SHALL BE PROMPTLY USED TO CONTAIN AND/OR CLEAN UP ALL FUEL OR CHEMICAL SPILLS OR LEAKS.
- DUST CONTROL SHALL BE ACCOMPLISHED BY WATERING DRY, EXPOSED AREAS ON A REGULAR BASIS, SPRAYING OF PETROLEUM BASED OR TOXIC LIQUIDS FOR THIS PURPOSE IS PROHIBITED.
- ALL SURPLUS SOIL AND STOCKPILED MATERIAL SHALL BE PLACED ON PREVIOUSLY DISTURBED AREA AND LOCATION SHALL BE APPROVED BY TPWD CONSTRUCTION MANAGER.
- NO WASH OUT PITS SHALL BE ALLOWED ANYWHERE ON PARK PROPERTY.
- NO MATERIAL SHALL BE DUMPED OR WASHED OFF ONTO THE GROUND, DITCHES, OR LAKE.
- IF A TANK OR ABOVE-GROUND IMPOUNDMENT IS USED, THE SITE MUST BE APPROVED BY THE RNRBC BEFORE USE.
- DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR AT LEAST FOURTEEN DAYS SHALL BE TEMPORARILY STABILIZED WITH VEGETATION AND MULCH.
- ALL VEHICLES SHALL BE CLEANED AT THE CONSTRUCTION EXIT POINTS ACCORDING TO NOTES SHOWN ON THE DETAIL THEREOF. IF THE MAJORITY OF MUD OR DIRT IS NOT REMOVED FROM EXISTING TRAFFIC, HOSE BIBS SHALL BE PROVIDED AT CONSTRUCTION TRAFFIC EXIT POINTS, AND VEHICLE TIRES SHALL BE WASHED BEFORE EXITING ONTO PUBLIC ROADS. SILT FOR THIS WASHING OPERATION SHALL BE INTERCEPTED AND TRAPPED BEFORE WASH WATER IS ALLOWED TO BE DISCHARGED OFF-SITE.
- ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED ONTO ADJACENT ROADWAYS BY VEHICLES EXITING THE SITE SHALL BE CLEANED OR REMOVED IMMEDIATELY.
- CONTRACTOR SHALL PREVENT ANY SILTATION FROM ENTERING THE STORM SEWER SYSTEM. ALL INLETS AND INLET OPENINGS SHALL BE FULLY ENCLOSED WITH APPROPRIATE INLET PROTECTION DEVICES.
- THE CONTRACTOR SHALL REMOVE ALL ACCUMULATED SILT IN ANY TEMPORARY OR PERMANENT DETENTION PONDS, STORM SEWER INLETS, AND PIPES, AND ALONG SILT FENCES, WITHIN 48 HOURS AFTER INSPECTION OF DEVICES REVEALS THE PRESENCE OF EXCESSIVE SILTATION (AS SPECIFIED IN SECTION 5.02 OF THE STORM WATER POLLUTION PREVENTION PLAN).
- SILT FENCES SHALL BE PLACED AROUND ANY STOCKPILES USED ON THIS SITE.
- THE CONTRACTOR IS ADVISED TO CONSTRUCT TEMPORARY OR PERMANENT FENCING AROUND DETENTION PONDS AND SEDIMENT BASINS AT THE EARLIEST TIME TO PREVENT ACCIDENTAL ACCESS BY PERSONS OR ANIMALS.
- ANY ADDITIONAL EROSION CONTROL MEASURES REQUIRED TO ENSURE COMPLIANCE WITH THE TPDES GENERAL PERMIT OR LOCAL PERMIT REQUIREMENTS SHALL BE IMPLEMENTED BY THE CONTRACTOR, AT NO ADDITIONAL EXPENSE TO THE OWNER.
- ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED AND PROPERLY DISPOSED OF OFF-SITE WITHIN THIRTY DAYS AFTER STABILIZATION ON ALL SURFACES.
- THE CONTRACTOR SHALL ASSUME LIABILITY FOR DAMAGE TO ADJACENT PROPERTIES AND/OR PUBLIC RIGHT-OF-WAY RESULTING FROM FAILURE TO FULLY IMPLEMENT AND EXECUTE ALL EROSION CONTROL PROCEDURES SHOWN AND NOTED IN THESE PLANS.
- WHENEVER DIRT, ROCK, OR OTHER MATERIALS IS IMPORTED OR EXPORTED ON THE PRIMARY CONSTRUCTION SITE, CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR COMPLIANCE WITH ALL TCEQ STORM WATER REQUIREMENTS FOR THE REMOTE SITE. CONTRACTOR SHALL FURNISH THE ENGINEER AND THE OWNER'S CONSTRUCTION MANAGER WITH DOCUMENTATION OF COVERAGE FOR THE BORROW OR FILL SITE INDICATING EROSION CONTROL MEASURES HAVE BEEN IMPLEMENTED THEREON. AT A MINIMUM, EROSION CONTROL MEASURES MUST CONSIST OF PERIMETER CONTROLS (SILT FENCES) ON ALL DOWN SLOPES AND SIDE SLOPE BOUNDARIES OF ANY DISTURBED AREA, PLUS PROVISIONS FOR RE-VEGETATION AFTER THE FILL MATERIAL IS IN PLACE.
- ALL SLOPES ON SITE WHICH ARE 4:1 OR STEEPER SHALL BE STABILIZED BY TRACK WALKING (TRAVERSING UP AND DOWN THE SLOPE WITH A TRACKED VEHICLE).

## ABBREVIATIONS

ABAN	ABANDON
ADA	AMERICANS WITH DISABILITIES ACT
ALUM	ALUMINUM
B	BORE
BOT	BOTTOM
BVCE	BEGINNING VERTICAL CURVE ELEVATION
BVCS	BEGINNING VERTICAL CURVE STATION
CONC	CONCRETE
CP	CONTROL POINT
DN	DIAMETER
DOWN	DOWN
E	EASTING
ELEV	ELEVATION
EVCE	END VERTICAL CURVE ELEVATION
EVCS	END VERTICAL CURVE STATION
EX	EXISTING
FF	FINISH FLOOR ELEVATION
FL	FLOW LINE
FLG	FLANGED
GROO	GROOVED
LOC	LIMITS OF CONSTRUCTION
L	LINEAR FEET
MAX	MAXIMUM
MJ	MECHANICAL JOINT
N	NORTH
OC	ON-CENTERS
PE	PLAN END
PI	POINT OF INFLECTION
PROP	PROPOSED
PT	POINT
PVI	POINT OF VERTICAL INFLECTION
PVMT	PAVEMENT
STA	STATION
STD	STANDARD
THK	THICKNESS
TY	TYPICAL
TW	TOP OF WALL ELEVATION
W	WELDED
WSEL	WATER SURFACE ELEVATION
WMH	WASTEWATER MANHOLE

## LEGEND

	CONCRETE MONUMENT
	CONTROL POINT
	BENCHMARK POINT
	BORE
	GUY WIRE
	POWER POLE
	FENCE POST
	TREE
	BARBED WIRE FENCE
	OVERHEAD ELECTRIC
	EDGE OF GRAVEL / TOP OF LEVEE
	EDGE OF VEGETATION
	EDGE OF WOODS
	APPROXIMATE LOCATION OF WOODS EDGE
	EDGE OF CONCRETE
	EDGE OF ROCK
	EDGE OF DIRT ROAD
	EXISTING BARBED WIRE FENCE
	PROPOSED BARBED WIRE FENCE
	PROPERTY LINE
	PROPOSED EASEMENT
	LIMITS OF CONSTRUCTION



BGE, Inc.  
F-1046

DUNDEE FISH HATCHERY  
WATER REUSE - EFFLUENT PUMP BACK  
TPWD No. 1110061r

DATE: 01/05/2021  
DESIGNED BY: OF  
DRAWN BY: MB  
REVIEWED BY: OF  
REVISION NO. 1  
REVISED:

SHEET TITLE  
GENERAL  
ABBREVIATIONS,  
SYMBOLS & DRAWING  
LEGEND

SHEET NUMBER  
G-02  
2 OF 70  
1110061r-G-02



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TAG NUMBER SCHEDULE															
TRAIN NUMBER	SECTION DESCRIPTION	FEATURE ID / TAG NUMBER	TYPE	MAIN DIA (IN) / BRANCH DIA (IN) / PIPE LENGTH (FT) / QUANTITY (EA)	EA OR FT	RADIUS	PRESSURE CLASS	MATERIAL	MIN WALL THICKNESS (IN)	LINING	COATING	JOINTS	PIPE END GAP (IN)	SPECS	
AT1	ALTERNATE GRAVITY LINE 001	AT1-01-18-PVC	PVC PIPE (NOTE 1)	18 N/A 5.0	FT N/A	235	PVC	1.08	1.08	N/A	N/A	N/A	N/A	02506, 15064, 15065	
		AT1-02-NA-JS	JUNCTION STRUCTURE	N/A N/A 1.0	EA STD	150	CONC	10	N/A	N/A	N/A	N/A	N/A	02081	
		AT1-03-NA-JS	SLIDE GATE & FRAME (WET WELL)	N/A N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11203	
		AT1-04-NA-JS	SLIDE GATE & FRAME (RIVER)	N/A N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11203	
		AT1-05-NA-RFA	RESTRAINED FLANGE ADAPTER	18 N/A 2.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02501	
		AT1-05-18-B22	22.5" BEND	18 N/A 1.0	EA STD	STD	DI	N/A	N/A	N/A	N/A	N/A	N/A	02501	
		AT1-06-18-PVC	PVC PIPE (NOTE 1)	18 N/A 5.3	FT N/A	235	PVC	1.08	1.08	N/A	N/A	N/A	N/A	02506, 15064, 15065	
		AT1-07-60-MH	MANHOLE	60 N/A 1.0	EA N/A	150	CONC	8	N/A	N/A	N/A	N/A	N/A	02081	
		AT1-08-18-PVC	PVC PIPE (NOTE 1)	18 N/A 750.5	FT N/A	235	PVC	1.08	1.08	N/A	N/A	N/A	N/A	02506, 15064, 15065	
		AT1-09-18-B45	45" BEND	18 N/A 1.0	EA STD	STD	DI	N/A	N/A	N/A	N/A	N/A	N/A	02501	
GL1	GRAVITY LINE 001	GL1-01-18-PVC	CAP	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02501	
		GL1-02-18-PVC	PVC PIPE (NOTE 1)	18 N/A 5.0	FT N/A	235	PVC	1.08	1.08	N/A	N/A	N/A	N/A	02506, 15064, 15065	
		GL1-03-NA-RFA	RESTRAINED FLANGE ADAPTER	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02081	
		GL1-04-NA-JS	JUNCTION STRUCTURE	N/A N/A 1.0	EA STD	150	CONC	10	N/A	N/A	N/A	N/A	N/A	11203	
		GL1-05-NA-JS	SLIDE GATE & FRAME (WET WELL)	N/A N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11203	
		GL1-06-NA-JS	SLIDE GATE & FRAME (RIVER)	N/A N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11203	
		GL1-07-18-FLA	GROOVED FLANGE ADAPTER	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	11203	
		GL1-08-18-STL	STEEL PIPE	18 N/A 1.0	FT N/A	N/A	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		GL1-09-18-A	ASSEMBLY	18 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		GL1-10-18-STL	STEEL PIPE	18 N/A 13.2	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
PL1	PUMP LINE 001	PL1-01-10-PMP	PUMP 1	10 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11311	
		PL1-03-8-GVC	GROOVED COUPLING	8 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-04-8-STL	STEEL PIPE	8 N/A 12.8	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-05-8-GVC	GROOVED COUPLING	8 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-06-8-B90	90° BEND	8 N/A 1.0	EA STD	STD	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-07-8-GVC	GROOVED COUPLING	8 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-08-8-STL	STEEL PIPE	8 N/A 1.0	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL1-09-1-CAV	COMBINATION AIR RELEASE/VACUUM VALVE	8 N/A 1.0	EA N/A	150	CI	N/A	N/A	N/A	N/A	N/A	N/A	15102	
		PL1-10-8-ACV	AUTOMATIC CONTROL CHECK VALVE	8 N/A 1.0	EA N/A	150	STL	N/A	N/A	N/A	N/A	N/A	N/A	15102	
		PL1-11-8-PLV	PLUG VALVE	8 N/A 1.0	EA N/A	N/A	CI	N/A	N/A	N/A	N/A	N/A	N/A	15102	
PL2	PUMP LINE 002	PL2-13-8-GVC	GROOVED COUPLING	8 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-01-60-PMP	PUMP 2 (BASE BID)	60 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11311	
		PL2-01A-34-PMP	PUMP 2 (ADD ALTERNATE 2)	34 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11311	
		PL2-02-8X12-ORD	ECCENTRIC REDUCER	8X12 N/A 1.0	EA N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-02A-6X12-ERD	ECCENTRIC REDUCER	6X12 N/A 1.0	EA N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-03-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-04-12-STL	STEEL PIPE	12 N/A 11.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-04A-12-STL	STEEL PIPE	12 N/A 10.6	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-05-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-06-12-B90	90° BEND	12 N/A 1.0	EA STD	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
PL3	PUMP LINE 003	PL2-07-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-08-12-STL	STEEL PIPE	12 N/A 6.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-09-1-CAV	COMBINATION AIR RELEASE/VACUUM VALVE	1 N/A 1.0	EA N/A	150	CI	N/A	N/A	N/A	N/A	N/A	N/A	02524	
		PL2-10-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-11-12-STL	STEEL PIPE	12 N/A 1.0	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-12-12-ACV	AIR CUSHIONED SWING CHECK VALVE	12 N/A 1.0	EA N/A	150	STL	N/A	N/A	N/A	N/A	N/A	N/A	15102	
		PL2-13-12-PLV	PLUG VALVE	12 N/A 1.0	EA N/A	N/A	CI	N/A	N/A	N/A	N/A	N/A	N/A	15102	
		PL2-14-12-STL	STEEL PIPE	12 N/A 0.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		PL2-15-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		PL3-01-60-PMP	PUMP 3	60 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11311	
DL1	DRAIN LINE 001	DL1-03-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-04-12-STL	STEEL PIPE	12 N/A 11.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-05-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-06-12-B90	90° BEND	12 N/A 1.0	EA STD	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-07-12-GVC	GROOVED COUPLING	12 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-08-10-STL	STEEL PIPE	10 N/A 3.8	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-09-10-GVC	GROOVED COUPLING	10 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-10-10-B90	90° BEND	10 N/A 1.0	EA STD	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-11-10-A	ASSEMBLY	10 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-12-10-STL	NOT USED	10 N/A 15.5	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
OF1	OVERFLOW LINE 001	DL1-13-10-B45	45" BEND	10 N/A 1.0	EA STD	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		DL1-14-10-STL	STEEL PIPE	10 N/A 7.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		OF1-01-18-FLA	GROOVED FLANGE ADAPTER	18 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15141	
		OF1-02-18-STL	STEEL PIPE	18 N/A 1.0	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		OF1-03-18-A	ASSEMBLY	18 N/A 1.0	EA N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		OF1-04-18-GVC	GROOVED COUPLING	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	15141	
		OF1-05-18-STL	STEEL PIPE	18 N/A 6.3	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		OF1-06-18-GVC	GROOVED COUPLING	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	15141	
		OF1-07-18-WYE	WYE CONNECTION	18 N/A 1.0	EA N/A	N/A	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		OF1-08-18-GVC	GROOVED COUPLING	18 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	15141	
FM1	FORCE MAIN LINE 001	OF1-09-18-STL	STEEL PIPE	18 N/A 7.7	FT N/A	STD	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		FM1-02-16-TEE	TEE	16 N/A 1.0	EA N/A	150	STL	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		FM1-03-16-GVC	GROOVED COUPLING	16 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	
		FM1-04-16-STL	STEEL PIPE	16 N/A 0.9	EA N/A	N/A	STD	DI	N/A	N/A	N/A	N/A	N/A	02502	
		FM1-05-16-GVC	GROOVED COUPLING	16 N/A 1.0	EA N/A	N/A	DI	N/A	N/A	N/A	N/A	N/A	N/A	02502	

LEGEND

11.25" BEND	B11
22.5" BEND	B22
45" BEND	B45
90° BEND	B90
ASSEMBLY	A
ALUMINUM PIPE	ALM
AIR CUSHIONED SWING CHECK VALVE	ACV
BLIND FLANGE	BLF
CAP	CAP
COMBINATION AIR RELEASE/VACUUM VALVE	CAV
CONCENTRIC REDUCER	CRD
CONCRETE VALVE SUPPORT	CVS
DUCTILE IRON PIPE	DIP
DUCTILE IRON x ALUMINUM COUPLING	DCA
ECCENTRIC REDUCER	ERD
EXPANSION JOINT	EXJ
FUSIBLE PVC PIPE	FVPC
SC OR FLG & GSKT	GSG
GROOVED COUPLING	GVC
GROOVED FLANGE ADAPTER	FLA
JUNCTION STRUCTURE	JS
MAGNETIC FLOWMETER SYSTEM	MFS
MANHOLE	MNH
MEGALUG RESTRAINT	MNR
NOT APPLICABLE	N/A
RESTRAINED FLANGE ADAPTER	RFA
SLIDE GATE & FRAME (WET WELL)	SGW
SLIDE GATE & FRAME (RIVER)	SGR
STEEL PIPE	STL
PUMP 1	PMP1
PUMP 2	PMP2
PUMP 3	PMP3
PLUG VALVE	PLV
STEEL PIPE	STL
STEEL x DUCTILE IRON FLANGE	SxD
TEE	TEE
WYE CONNECTION	WYC

FM1-01-16-BLF

DESCRIPTION  
SIZE (IN)  
SEQUENCE NUMBER  
TRAIN NUMBER

NOTE:  
1. CERTA-LOK MAY BE BID AS  
EQUAL PRODUCT TO FUSIBLE PVC.

TEXAS  
PARKS  
WILDLIFE

STATE OF TEXAS  
DORIAN FRENCH  
GOVERNOR

BCE, Inc.  
F-1046

DUNDEE FISH HATCHERY  
WATER REUSE - EFFLUENT PUMP BACK

TPWD No. 1100618

DATE: 07-20-2020  
DESIGNED BY: DF  
DRAWN BY: MB  
REVIEWED BY: DF  
REVISION: 3-2021  
ADDRESS NO. 1  
REVISED:

SHEET TITLE  
TAG TABLE  
INDEX 1 OF 3

SHEET NUMBER  
G-03  
3 OF 70  
1100618-01-G-03A



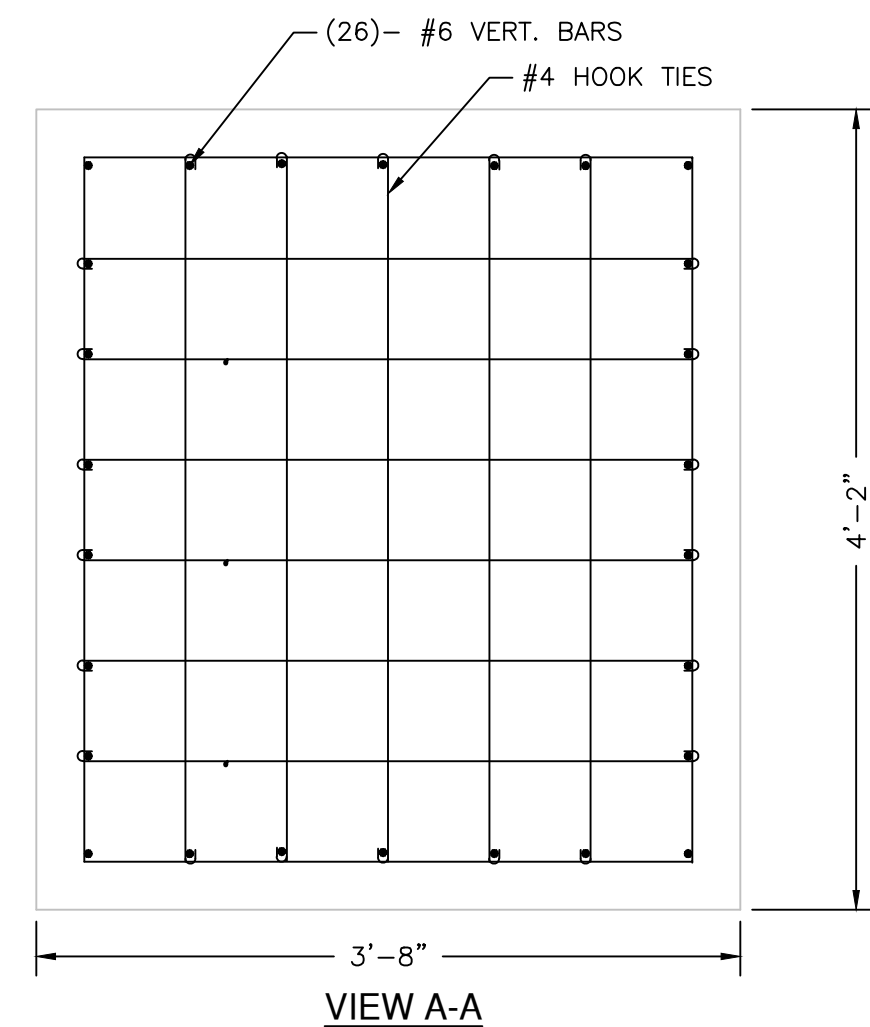
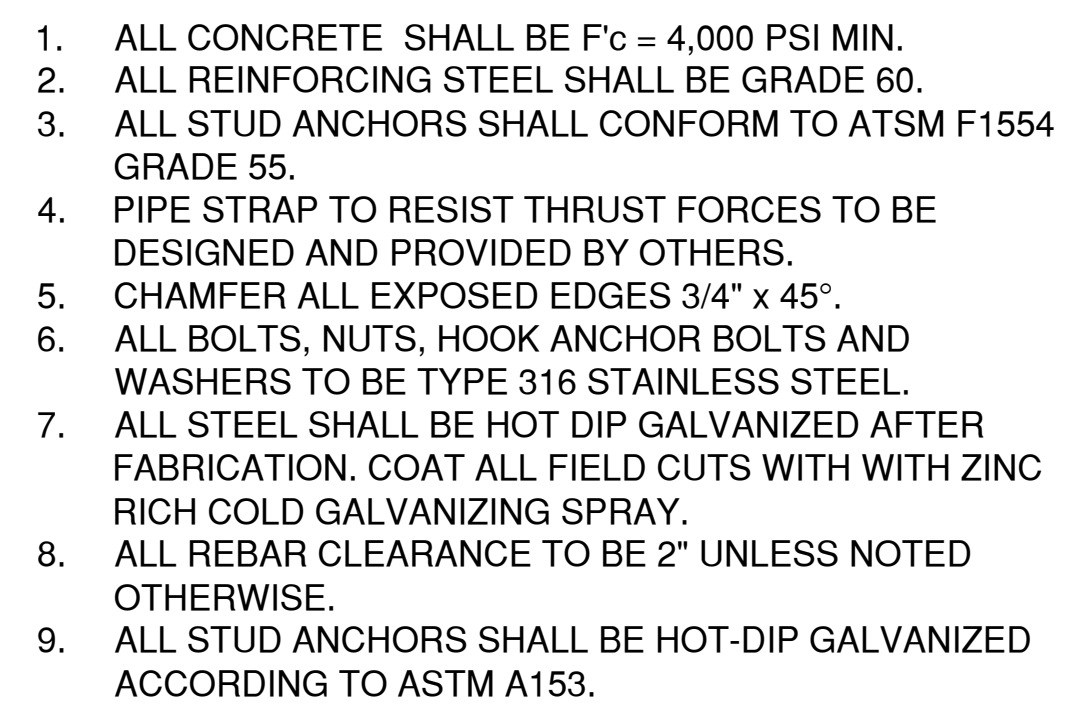
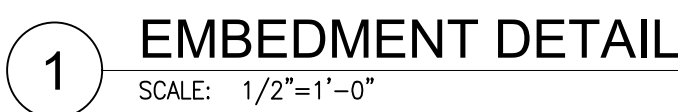
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DRAWN BY: J. J. JONES  
CHECKED BY: J. J. JONES  
DATE: 07-20-2020  
DESIGNED BY: J. J. JONES  
REVIEWED BY: J. J. JONES  
REVISION: 3-2021  
ADDENDUM NO. 1  
REVISED:  
SHEET TITLE  
TAG TABLE INDEX  
2 OF 3  
G-04  
4 OF 70  
1110061-2-02B

NOT IN CONTRACT

TAG NUMBER SCHEDULE (CONTINUED)																	
TRAIN NUMBER	SECTION DESCRIPTION	FEATURE ID / TAG NUMBER	TYPE	MAIN DIA (IN) / PUMP SIZE (HP)	BRANCH DIA (IN)	PIPE LENGTH (FT) / QUANTITY (EA)	EA OR FT	RADIUS	PRESSURE CLASS	MATERIAL	MIN WALL THICKNESS (IN)	LINING	COATING	JOINTS	PIPE END GAP (IN)	SPECS	
FM1	FORCE MAIN LINE 001	FM1-09-16-BLF	BLIND FLANGE	16		1.0	EA	NA	150	STL	NA	EPOXY	POLYURETHANE	G/G	NA	02502	
		FM1-10-16-TEE	TEE	16	12	1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	G/G	NA	02502	
		FM1-11-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-12-10X16-GRD	CONCENTRIC REDUCER	10X16	NA	1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	FLG/G	NA	02502	
		FM1-13-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-14-10-STL	STEEL PIPE	10	NA	0.7	FT	NA	STD	STL	0.375	EPOXY	POLYURETHANE	G/G	NA	02502	
		FM1-15-10-PLV	PLUG VALVE	10		1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	FLG/FLG	NA	15102	
		FM1-16-10-TEE	TEE	10	8	1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	FLG/FLG	NA	02502	
		FM1-17-1-CAV	COMBINATION AIR RELEASE/VACUUM VALVE	1	NA	1.0	EA	NA	150	CI	NA	EPOXY	POLYURETHANE	FLG	NA	02524	
		FM1-18-10-PLV	PLUG VALVE	10		1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	FLG/FLG	NA	15102	
		FM1-19-10-STL	STEEL PIPE	10	NA	0.5	FT	NA	STD	STL	0.375	EPOXY	POLYURETHANE	FLG/G	NA	02502	
		FM1-20-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-21-10-STL	STEEL PIPE	10	NA	3.9	FT	NA	STD	STL	0.375	EPOXY	POLYURETHANE	FLG/G	NA	02502	
		FM1-22-10-MFS	MAGNETIC FLOWMETER SYSTEM	10	NA	1.0	EA	NA	STD	SS	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-23-10-STL	STEEL PIPE	10	NA	1.5	FT	NA	STD	STL	0.375	EPOXY	POLYURETHANE	FLG/G	NA	02502	
		FM1-24-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-25-10X16-GRD	CONCENTRIC REDUCER	10X16	NA	1.0	EA	NA	STD	STL	NA	EPOXY	POLYURETHANE	FLG/G	NA	02502	
		FM1-26-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-27-16-STL	STEEL PIPE	16	NA	4.3	FT	NA	STD	STL	0.375	EPOXY	POLYURETHANE	G/G	NA	02502	
		FM1-28-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0.13 - 0.31	15141	
		FM1-29-16-B90	90° BEND	16	NA	1.0	EA	STD	STD	STL	0.375	EPOXY	POLYURETHANE	G/G	NA	02502	
		FM1-30-16-SxD	STEEL x DUCTILE IRON FLANGE	16	NA	1.0	EA	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	M/J/G	NA	02501, 02502	
		FM1-31-16-DIP	DUCTILE IRON PIPE	16	NA	3.9	FT	NA	150	DI	NA	NA	EPOXY	M/J/G	M/J/G	NA	02501
		FM1-32-16-B90	90° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	EPOXY	M/J/G	M/J/G	NA	02501
		FM1-33-16-A	ASSEMBLY	16	NA	1.0	EA	NA	150	DI	NA	EPOXY	G/G	0 - 0.16	MECHANICAL: SEE SHEET M-05; DETAIL 3 & NOTE 3		
		FM1-34-16-B45	45° BEND	16	NA	1.0	EA	STD	150	DI	NA	M/J/G	M/J/G	M/J/G	M/J/G	NA	02501
		FM1-35-16-MLR	MEGALUG RESTRAINT	16	NA	1.0	EA	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-36-16-PVC	PVC PIPE (NOTE 1)	16	NA	61.2	FT	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-37-16-B45	45° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-38-16-PVC	PVC PIPE (NOTE 1)	16	NA	214.9	FT	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-39-16-B11	11.25° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-40-16-PVC	PVC PIPE (NOTE 1)	16	NA	37.7	FT	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-41-16-B11	11.25° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-42-16-B11	11.25° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-43-16-B22	22.5° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-44-16-PVC	PVC PIPE (NOTE 1)	16	NA	270.6	FT	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-45-16-B45	45° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	NA	NA	NA	02501	
		FM1-46-16-PVC	PVC PIPE (NOTE 1)	16	NA	252.3	FT	NA	235	PVC	0.97	NA	NA	NA	NA	02506, 15064, 15065	
		FM1-46A-16-MLR	MEGALUG RESTRAINT	16	NA	1.0	EA	NA	235	PVC	0.97	DP 1 X PVC	NA	NA	NA	02501	
		FM1-46B-16-DIP	DUCTILE IRON PIPE	16	NA	1.7	FT	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	G/G	0 - 0.16	15141	
		FM1-46C-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0 - 0.16	15141	
		FM1-46D-16-A	ASSEMBLY	16	NA	1.0	EA	NA	STD	DI	NA	NA	EPOXY	G/G	0 - 0.16	MECHANICAL: SEE SHEET M-05; DETAIL 3 & NOTE 3	
		FM1-47-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0 - 0.16	15141	
		FM1-48-16-B90	90° BEND	16	NA	1.0	EA	STD	150	DI	NA	NA	ORANGE ENAMEL	G/G	0 - 0.16	15141	
		FM1-49-16-GVC	GROOVED COUPLING	16	NA	1.0	EA	NA	STD	DI	NA	NA	ORANGE ENAMEL	G/G	0 - 0.16	15141	
		FM1-50-16-DIP	DUCTILE IRON PIPE	16	NA	10.1	FT	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	G/G	0 - 0.16	15141	
		FM1-51-16-B45	45° BEND	16	NA	1.0	EA	STD	150	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-52-16-B90	90° BEND	16	NA	2.7	EA	STD	150	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-53-16-TEE	TEE	16	10	1.0	EA	NA	STD	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-54-10X16-GRD	CONCENTRIC REDUCER	10X16	NA	1.0	EA	NA	STD	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-55-10-DIP	DUCTILE IRON PIPE	10	NA	2.0	FT	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	FLG/FLG	NA	02501	
		FM1-56-10-B90	90° BEND	10	NA	1.0	EA	STD	150	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-57-10-DIP	DUCTILE IRON PIPE	10	NA	1.5	FT	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	FLG/FLG	NA	02501	
		FM1-58-10-PLV	PLUG VALVE	10		1.0	EA	NA	STD	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	15102	
		FM1-59-10-DxAl	DUCTILE IRON x ALUMINUM COUPLING	10	NA	1.0	EA	STD	150	DI	NA	FLG/G	NA	NA	NA	15141	
		FM1-60-10-CAP	CAP	10		1.0	EA	NA	150	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	02501	
		FM1-61-10-DIP	DUCTILE IRON PIPE	10	NA	1.5	FT	NA	150	DI	NA	POLYURETHANE	POLYURETHANE	FLG/FLG	NA	15102	
		FM1-62-10-PLV	PLUG VALVE	10		1.0	EA	NA	STD	DI	NA	FLG/FLG	FLG/FLG	FLG/FLG	NA	15141	
		FM1-63-10-DxAl	DUCTILE IRON x ALUMINUM COUPLING	10	NA	1.0	EA	STD	150	DI	NA	G	NA	NA	NA	15141	
		FM1-64-10-CAP	CAP	10		1.0	EA	NA	150	DI	NA	G	NA	NA	NA	15141	
TP1	TEMPORARY PIPE 001	TP1-01-10-B45	45° BEND	10	NA	1.0	EA	STD	50	ALUM	0.25			G/G	NA		
		TP1-02-10-GVC	GROOVED COUPLING (RIGID)	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0.2	15141	
		TP1-03-10-EXJ	EXPANSION JOINT (0.5")	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	NA		
		TP1-04-10-GVC	GROOVED COUPLING (RIGID)	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0.2	15141	
		TP1-05-10-ALM	ALUMINUM PIPE	10	NA	10.0	FT	NA	50	ALUM	0.365			G/G	NA		
		TP1-06-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-07-10-B45	45° BEND	10	NA	1.0	EA	STD	50	ALUM	0.25			G/G	0 - 0.125	15141	
		TP1-08-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-09-10-ALM	ALUMINUM PIPE	10	NA	2.0	FT	NA	50	ALUM	0.365			G/G	NA		
		TP1-10-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-11-10-EXJ	EXPANSION JOINT (0.5")	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-12-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-13-10-ALM	ALUMINUM PIPE	10	NA	1.0	EA	NA	50	ALUM	0.365			G/G	0 - 0.125	15141	
		TP1-14-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-15-10-B90	90° BEND	10	NA	1.0	EA	STD	50	ALUM	0.25			G/G	NA		
		TP1-16-10-GVC	GROOVED COUPLING	10	NA	1.0	EA	NA	50	ALUM	NA			G/G	0 - 0.125	15141	
		TP1-17															

LAST SAVED BY: WILLIAMS DOTTED: 3/17/2021 11:16:09 AM SOFTWARE: 2D 2018  
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TAG NUMBER SCHEDULE (CONTINUED)																	
TRAIN NUMBER	SECTION DESCRIPTION	FEATURE ID / TAG NUMBER	TYPE	MAIN DIA (IN) / PUMP SIZE (HP)	BRANCH DIA (IN)	PIPE LENGTH (FT) / QUANTITY (EA)	EA OR FT	RADIUS	PRESSURE CLASS	MATERIAL	MIN WALL THICKNESS (IN)	LINING	COATING	JOINTS	PIPE END GAP (IN)	SPECS	
TP1	TEMPORARY PIPE 001	TP1-38-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-39-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-40-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-41-10-ALM	ALUMINUM PIPE	10	N/A	3.2	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-42-10-EXJ	EXPANSION JOINT (2.5")	10	N/A	1.0	EA	N/A	50	CS	N/A			G/G	N/A		
		TP1-43-10-GVC	GROOVED COUPLING	10	N/A	3.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-44-10-B22	22.5" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A		
		TP1-45-10-GVC	GROOVED COUPLING	10	N/A	3.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-46-10-B11	11.25" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A		
		TP1-47-10-BEJ	NOT USED														
		TP1-48-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-49-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-50-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-51-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-52-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-53-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-54-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-55-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-56-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-57-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-58-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-59-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-60-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP1-61-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP1-62-10-ALM	ALUMINUM PIPE	10	N/A	9.6	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP2-01-10-B45	45" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A		
		TP2-02-10-GVC	GROOVED COUPLING (RIGID)	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0.2	15141	
		TP2-03-10-EXJ	EXPANSION JOINT (0.5")	10	N/A	1.0	EA	N/A	50	CS	N/A			G/G	N/A		
		TP2-04-10-GVC	GROOVED COUPLING (RIGID)	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0.2	15141	
		TP2-05-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A		
		TP2-06-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141	
		TP2-07-10-B45	45" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A		
TP2-08-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-09-10-ALM	ALUMINUM PIPE	10	N/A	7.6	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-10-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-11-10-EXJ	EXPANSION JOINT (0.5")	10	N/A	1.0	EA	N/A	50	CS	N/A			G/G	N/A				
TP2-12-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-13-10-ALM	ALUMINUM PIPE	10	N/A	1.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-14-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-15-10-B90	90" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A				
TP2-16-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-17-10-ALM	ALUMINUM PIPE	10	N/A	1.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-18-10-GVC	GROOVED COUPLING (RIGID)	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0.2	15141			
TP2-18A-10-EXJ	EXPANSION JOINT (0.5")	10	N/A	1.0	EA	N/A	50	CS	N/A			G/G	N/A				
TP2-18B-10-GVC	GROOVED COUPLING (RIGID)	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0.2	15141			
TP2-19-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-20-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-21-10-ALM	ALUMINUM PIPE	10	N/A	13.2	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-22-10-GVC	GROOVED COUPLING	10	N/A	3.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-23-10-B22	22.5" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A				
TP2-24-10-GVC	GROOVED COUPLING	10	N/A	3.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-25-10-B11	11.25" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A				
TP2-26-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-27-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-28-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-29-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-30-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-31-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-32-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-33-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-34-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-35-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-36-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-37-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-38-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-39-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-40-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-41-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-42-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-43-10-ALM	ALUMINUM PIPE	10	N/A	6.8	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-44-10-EXJ	EXPANSION JOINT (2.5")	10	N/A	1.0	EA	N/A	50	CS	N/A			G/G	N/A				
TP2-45-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-46-10-B22	22.5" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A				
TP2-47-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-48-10-ALM	ALUMINUM PIPE	10	N/A	1.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-49-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-50-10-B11	11.25" BEND	10	N/A	1.0	EA	STD	50	ALUM	0.25			G/G	N/A				
TP2-51-10-BEJ	NOT USED																
TP2-52-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-53-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-54-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-55-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-56-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-57-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-58-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-59-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-60-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-61-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-62-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-63-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-64-10-ALM	ALUMINUM PIPE	10	N/A	10.0	FT	N/A	50	ALUM	0.365			G/G	N/A				
TP2-65-10-GVC	GROOVED COUPLING	10	N/A	1.0	EA	N/A	50	ALUM	N/A			G/G	0 - 0.125	15141			
TP2-66-10-ALM	ALUMINUM PIPE	10	N/A	9.5	FT	N/A	50	ALUM	0.365			G/G	N/A				



(18)- #6 VERT. BARS

#4 HOOK TIES

2'-6"

3'-8"

VIEW A-A

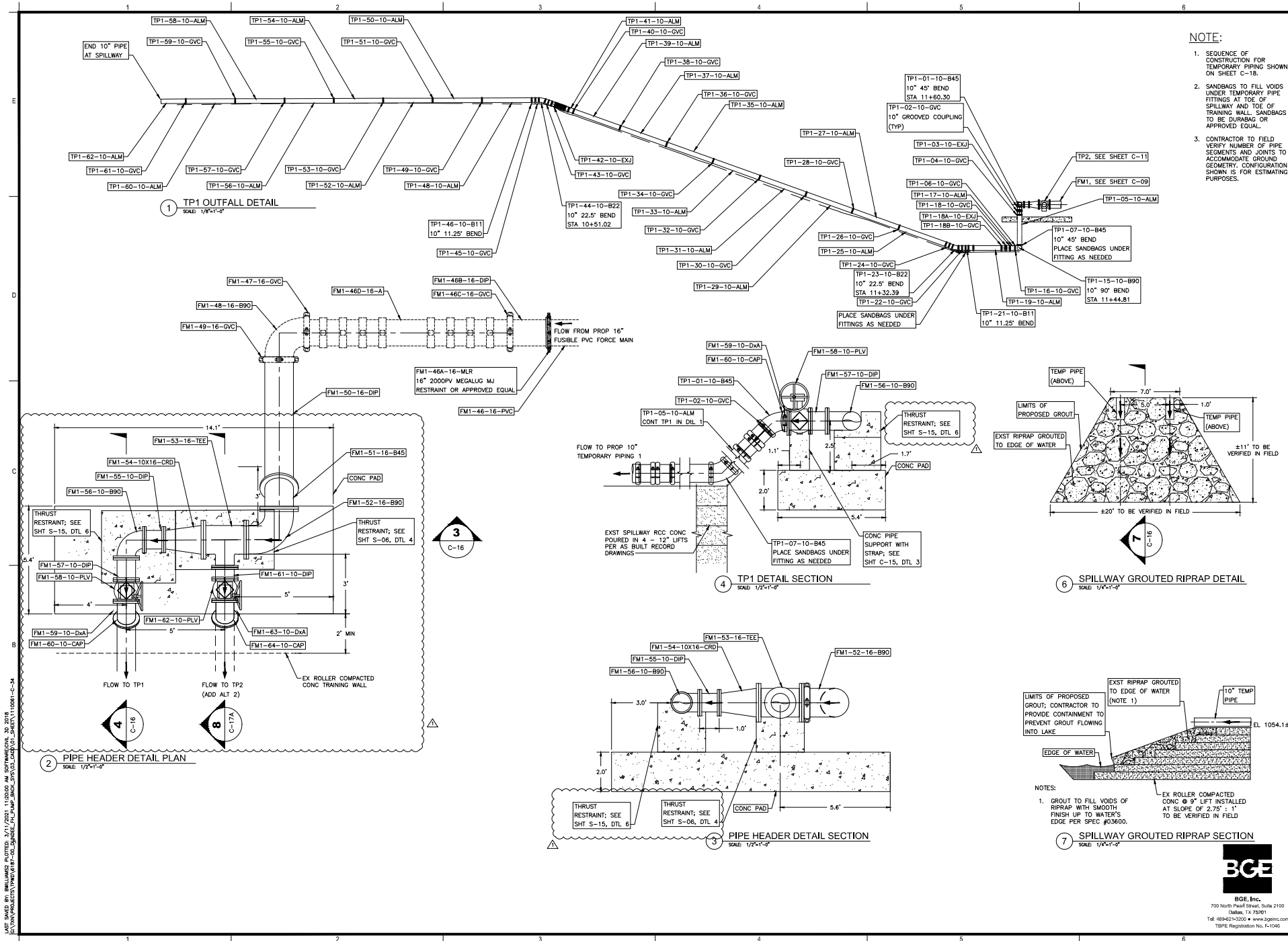
FOR ALL LINES LESS THAN 16" DIAMETER PIPE  
CONNECTED TO 90° ELBOWS

21 OF 70  
1110061-C-31





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C:\WORK\PROJECTS\TPW\B-15-05-SPILLWAY PUMP BACK\DWG\110061R-C-34



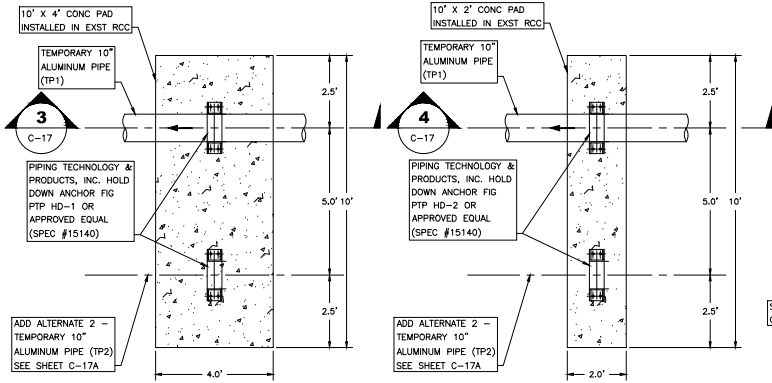
- NOTE:
- SEQUENCE OF CONSTRUCTION FOR TEMPORARY PIPING SHOWN ON SHEET C-18.
  - SANDBAGS TO FILL VOIDS UNDER TEMPORARY PIPE FITTINGS AT TOE OF SPILLWAY AND TOE OF TRAINING WALL. SANDBAGS TO BE DURABAG OR APPROVED EQUAL.
  - CONTRACTOR TO FIELD VERIFY NUMBER OF PIPE SEGMENTS AND JOINTS TO ACCOMMODATE GROUND GEOMETRY. CONFIGURATION SHOWN IS FOR ESTIMATING PURPOSES.

TEXAS  
FARKS  
WHEEL

SEAL OF TEXAS  
JORDAN FRENCH  
40445  
REGISTERED PROFESSIONAL ENGINEER  
06/28/2020  
BGE, Inc.  
F-1046

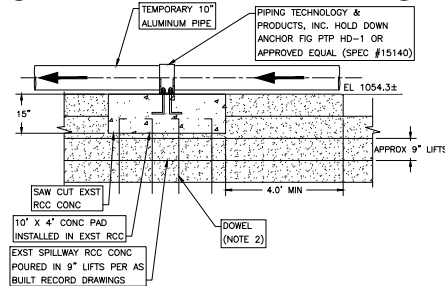
DUNDEE FISH HATCHERY  
WATER REUSE - EFFLUENT PUMP BACK

LAST SAVED BY: WILLIAMS DATED: 3/17/2021 11:25:06 AM SOFTWARE: 2D 2018  
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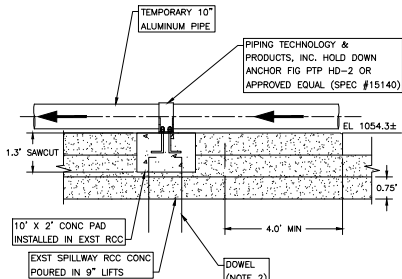


1 SPILLWAY CREST PIPE RESTRAINT DETAIL  
 SCALE: 1/2"=1'-0"

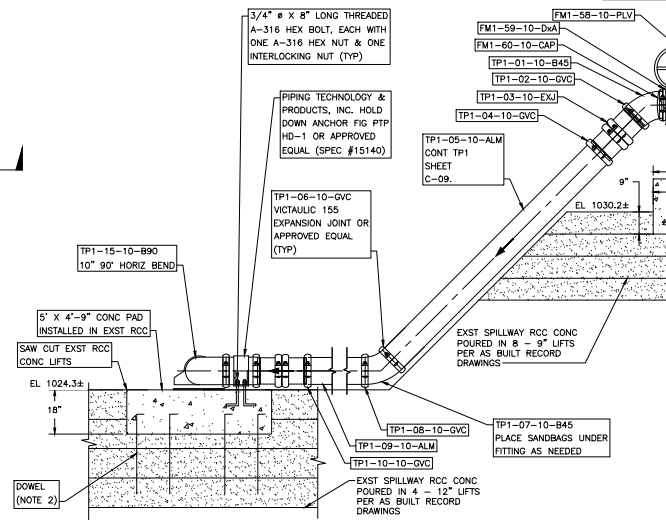
2 SPILLWAY CREST PIPE RESTRAINT DETAIL  
 SCALE: 1/2"=1'-0"



3 SPILLWAY CREST PIPE RESTRAINT SECTION DETAIL  
 SCALE: 1/2"=1'-0"

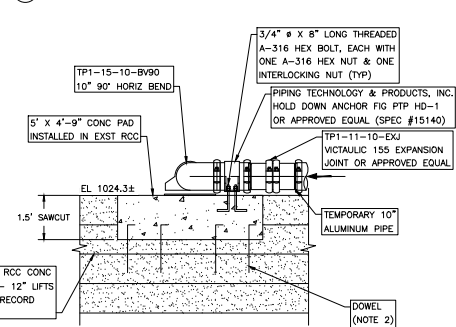


4 SPILLWAY CREST PIPE RESTRAINT SECTION DETAIL  
 SCALE: 1/2"=1'-0"

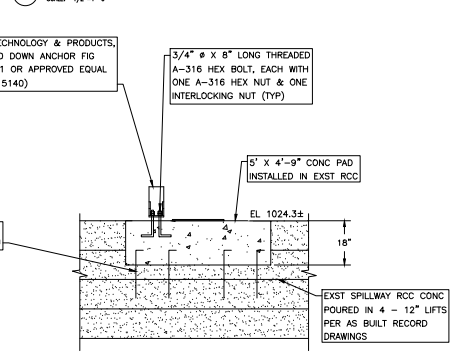


6 STILLING BASIN ELBOW ANCHOR DETAIL  
 SCALE: 1/2"=1'-0"

5 TEMPORARY TRAINING WALL PIPE DESCENT DETAIL (TP1)  
 SCALE: 1/2"=1'-0"



7 ELBOW ANCHOR DETAIL SECTION  
 SCALE: 1/2"=1'-0"



8 ELBOW ANCHOR DETAIL SECTION  
 SCALE: 1/2"=1'-0"

- NOTE:
- HEX NUTS & INTERLOCKING NUTS TO BE COVERED WITH NEOPRENE CAPS WHEN NOT IN USE.
  - HOOKE DOWEL CONCRETE SUPPORT INTO RCC TO A DEPTH OF 1.5 TIMES THE RCC LIFT HEIGHT AND FILL WITH HIGH STRENGTH EPOXY GROUT. SPACE 6" FROM EDGE AND 12" OC/W (SPEC #03200).
  - CONTRACTOR TO FIELD VERIFY NUMBER OF PIPE SEGMENTS AND JOINTS TO ACCOMMODATE GROUND GEOMETRY. CONFIGURATION SHOWN IS FOR ESTIMATING PURPOSES.

DUNDEE FISH HATCHERY  
 WATER REUSE - EFFLUENT PUMP BACK  
 TPWD No. 1110061-R

DATE: 01/05/2021  
 DESIGNED BY: DF  
 DRAWN BY: MB  
 REVIEWED BY: DF  
 REVISION: 3-2021  
 ADDENDUM NO. 1  
 REVISED:

SHEET TITLE  
 FORCE MAIN  
 DISCHARGE DETAILS  
 SHEET 2 OF 3

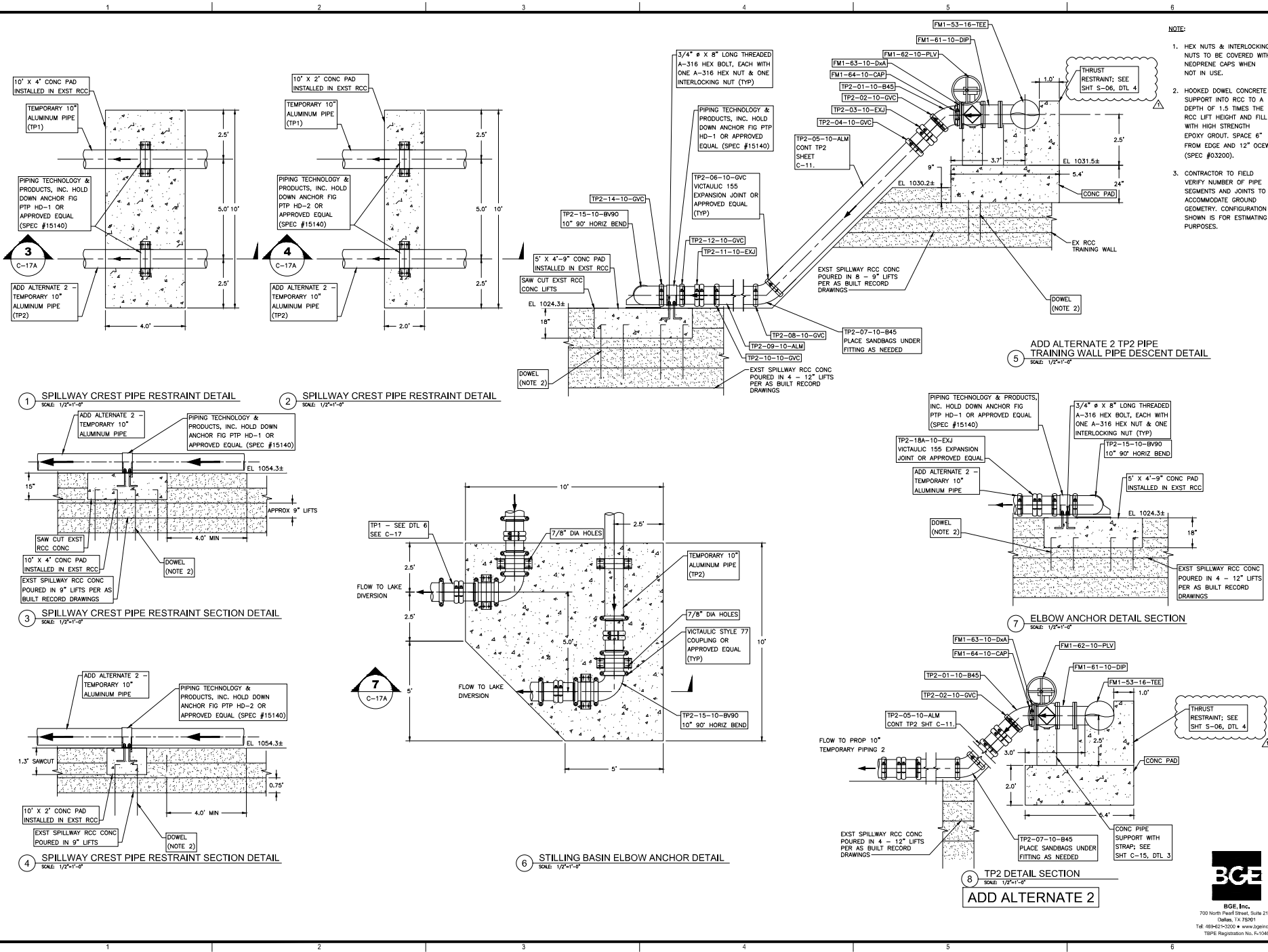
SHEET NUMBER  
 C-17  
 23 OF 70  
 1110061-C-34



BCE, Inc.  
 700 North Pearl Street, Suite 2100  
 Dallas, TX 75201  
 Tel: 469-621-3200 • www.bceinc.com  
 TBPB Registration No. F-1046



LAST SAVED BY: WILLIAMS DATED: 3/17/2021 11:27:44 AM SOW: 110061-C-34-REV  
 C:\PROJECTS\110061-C-34-REV\110061-C-34-REV\110061-C-34-REV.DWG



**NOTE:**

1. HEX NUTS & INTERLOCKING NUTS TO BE COVERED WITH NEOPRENE CAPS WHEN NOT IN USE.
2. HOOKED DOWEL CONCRETE SUPPORT INTO RCC TO A DEPTH OF 1.5 TIMES THE RCC LIFT HEIGHT AND FILL WITH HIGH STRENGTH EPOXY GROUT. SPACE 6" FROM EDGE AND 12" OC (SPEC #03200).
3. CONTRACTOR TO FIELD VERIFY NUMBER OF PIPE SEGMENTS AND JOINTS TO ACCOMMODATE GROUND GEOMETRY. CONFIGURATION SHOWN IS FOR ESTIMATING PURPOSES.



BCE, Inc.  
 F-1046

**DUNDEE FISH HATCHERY**  
**WATER REUSE - EFFLUENT PUMP BACK**  
 TPWD No. 1110061-R

DATE: 01/05/2021  
 DESIGNED BY: DF  
 DRAWN BY: MB  
 REVIEWED BY: DF  
 REVISED: 3-2021 OF  
 ADDENDUM NO. 1

**SHEET TITLE**

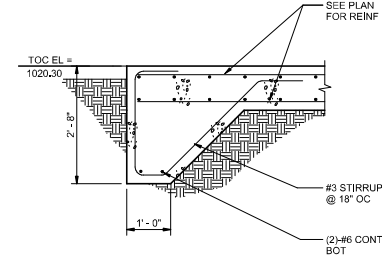
ADD ALT 2 FORCE  
 MAIN DISCHARGE  
 DETAILS

**SHEET NUMBER**

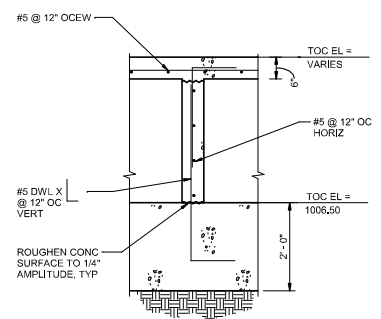
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 23A OF 70  
 1110061-C-34-REV



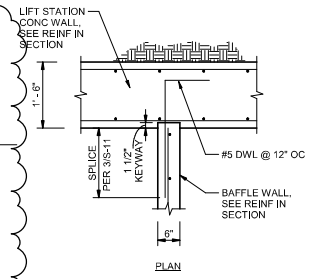
BCE, Inc.  
 700 North Pearl Street, Suite 2100  
 Dallas, TX 75201  
 Tel: 469-621-3200 • www.bceinc.com  
 TPIE Registration No. F-1046



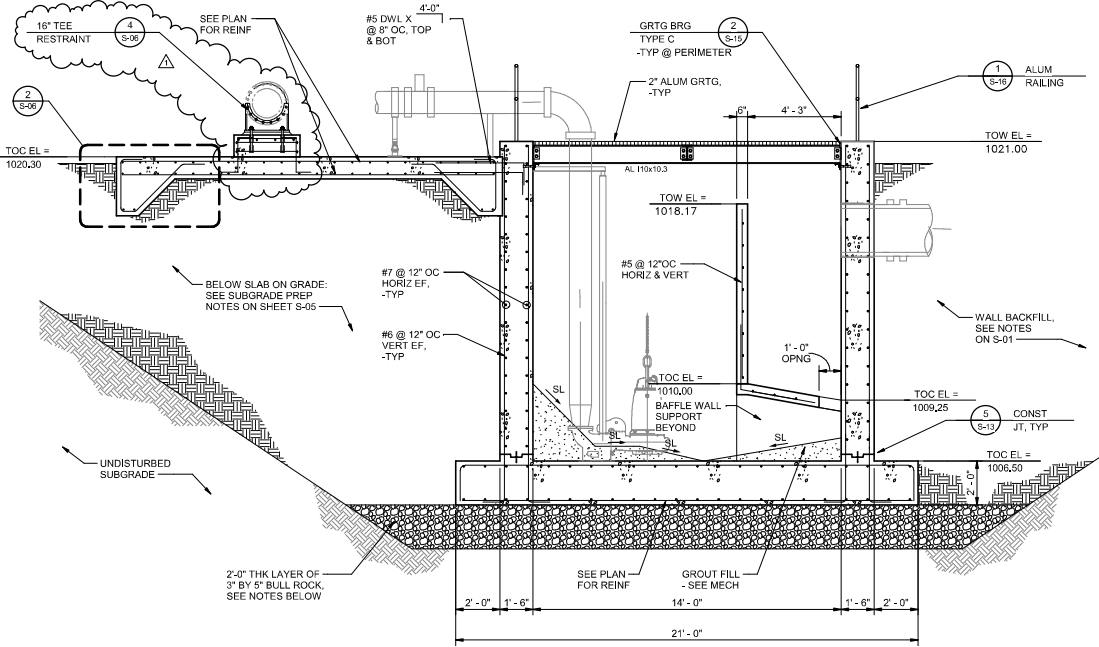
2 DETAIL  
SCALE: 3/4" = 1'-0"



3 BAFFLE WALL SUPPORT DETAIL  
SCALE: 3/4" = 1'-0"



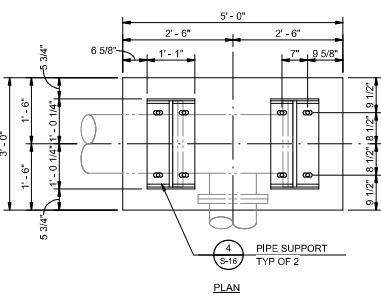
5 BAFFLE WALL CJ DETAIL  
SCALE: 3/4" = 1'-0"



1 SECTION  
SCALE: 3/8" = 1'-0"

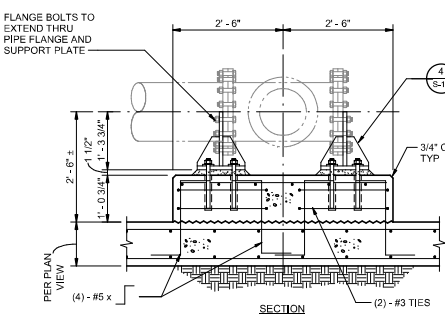
BULL ROCK NOTES:

- OVER-EXCAVATE TO 2-FT BELOW THE FOUNDATION OF THE LIFT STATION WET WELL. THE EXISTING SUBGRADE IS A SANDY LEAN CLAY AND LOOSE TO VERY LOOSE SAND. REMOVE ANY SOFT OR WEAK MATERIALS ENCOUNTERED AT THE BASE OF THE EXCAVATION.
- PROVIDE A 2-FT LAYER OF 3-INCH BY 5-INCH BULL ROCK. THE BULL ROCK SHALL BE PLACED IN 8-INCH LIFTS AND WORKED INTO THE SUBGRADE BY ROLLING WITH A RUBBER TIRE LOADER OR OTHER HEAVY EQUIPMENT.

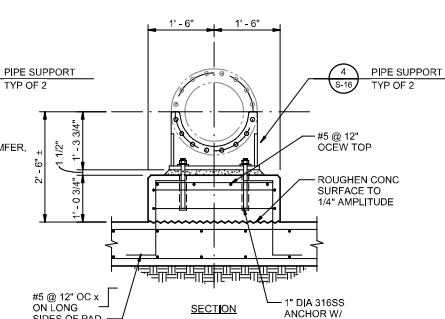


- NOTES:
- ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION. REPAIR FIELD CUTS/DAMAGE WITH A ZINC RICH COLD GALVANIZING SPRAY.
  - COORDINATE FINAL SUPPORT LOCATIONS WITH THE APPROVED PIPING/FITTINGS SUBMITTAL PRIOR TO INSTALLING THE ANCHORS AND PIPE SUPPORTS.

4 THRUST RESTRAINT 16" TEE  
SCALE: 3/4" = 1'-0"



2 SECTION  
SCALE: 3/4" = 1'-0"

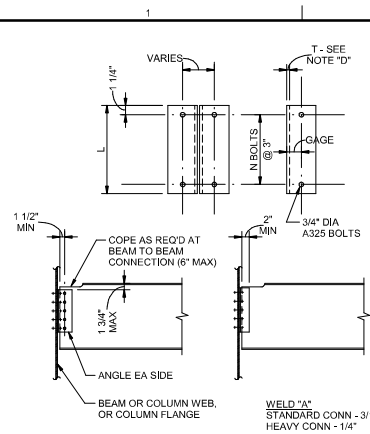


3 SECTION  
SCALE: 3/4" = 1'-0"





DATE: 3/9/2021 2:52:47 PM



BEAM SIZE	ANGLE LENGTH (L)	NO OF ROWS OF BOLTS (N)	BOLTED/BOLTED			BOLTED/WELDED
			UNCOPED	COPED TOP	COPED TOP AND BOT	MAX BEAM REACTION (KIPS)
W8-W12	5 1/2"	2	20	15	12	39
W12-W18	8 1/2"	3	35	27	23	59
W16-W24	11 1/2"	4	58	45	40	87
W18-W30	14 1/2"	5	78	66	61	108
W21-W36	17 1/2"	6	105	92	86	128
W24-W36	20 1/2"	7	134	121	114	149
W27-W36	23 1/2"	8	169	161	152	169
W30-W36	26 1/2"	9	189	184	175	189
W33-W36	29 1/2"	10	209	209	209	209
W36	32 1/2"	11	230	230	230	229

**NOTES:**

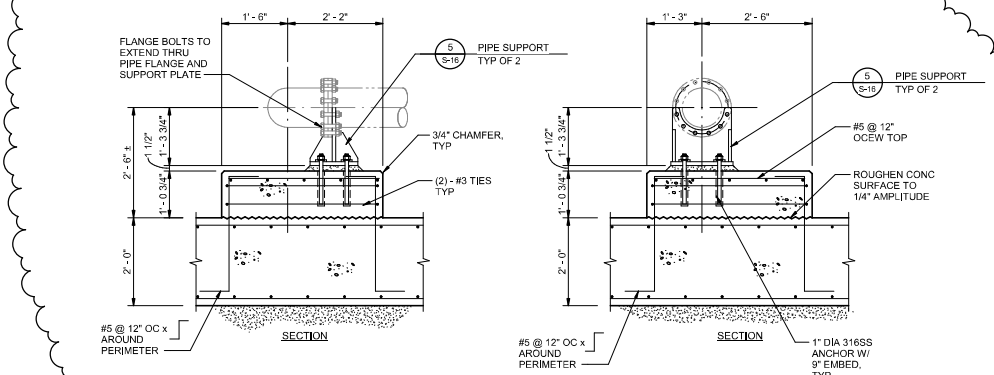
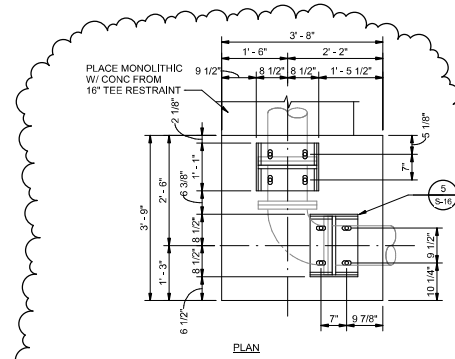
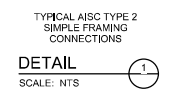
A. RIGHT ANGLE CONNECTIONS SHALL BE DOUBLE ANGLE AS SCHEDULED.

B. NOTED REACTIONS ARE FOR SERVICE LOADS.

C. REFER TO "STRUCTURAL STEEL CONNECTIONS" STRUCTURAL NOTES ON SHEET 5-02 FOR ADDNL INFO.

D. MINIMUM CONNECTION ANGLE THICKNESS IS 5/16".

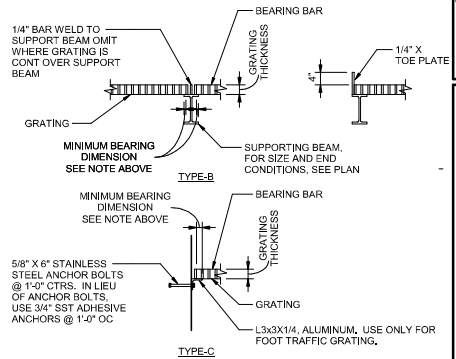
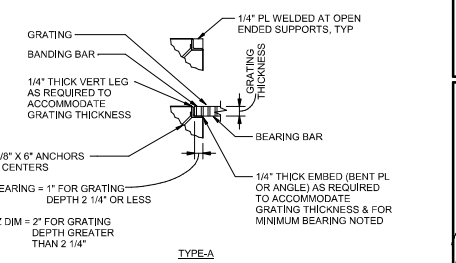
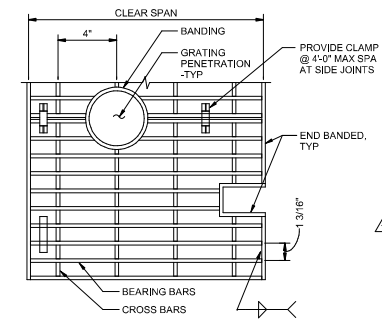
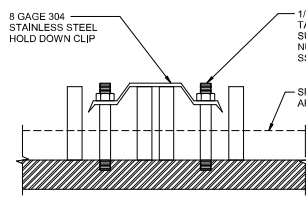
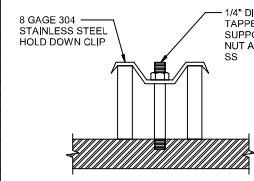
E. BOLTS ARE 3/4" DIA A325N.



**NOTES:**

1. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION. REPAIR FIELD CUTS/DAMAGE WITH A ZINC RICH COLD GALVANIZING SPRAY.

2. COORDINATE FINAL SUPPORT LOCATIONS WITH THE APPROVED PIPING/FITTINGS SUBMITTAL PRIOR TO INSTALLING THE ANCHORS AND PIPE SUPPORTS.



**NOTES:**

1. ALL BEARING ANGLES AND GRATING EMBEDS SHALL MATCH GRATING MATERIAL UNO ON DRAWINGS.



**NOTES:**

1. GRATING SHALL CONFORM TO THE METAL BAR GRATING MANUAL OF NAIML, UNLESS OTHERWISE SPECIFIED.

2. GRATING SHALL BE AS NOTED ON THE DRAWINGS.

3. WHERE BOLTED GRATING IS SPECIFIED, PROVIDED 4 GRATING CLIPS APPROX 4" FROM THE CORNERS OF EACH PIECE. ADJACENT PIECES MAY BE ANCHORED WITH ONE CLIP AND TWO STUDS.

4. GRATING SHALL BE REMOVABLE.

5. CLEAR SPAN SHALL BE PLAN DIMENSION, FACE TO FACE OF OPENING.

6. WELD END BANDING TO BEARING BARS PER MANUFACTURER'S RECOMMENDATION.

7. REFER TO SPECIFICATION SECTION 05330 FOR ADDITIONAL INFORMATION ON ALUMINUM GRATING.

8. PROVIDE REMOVABLE ALUMINUM COVER PLATES OVER FUTURE GRATING PENETRATIONS AT THE LIFT STATION. MAXIMUM COVER PLATE THICKNESS TO BE 1/4" THK TO AVOID A TRIPPING HAZARD.



**BGE, Inc.**

700 N. Pearl Street, Suite 2100  
Dallas, TX 75201

TEL 469-651-1200 • www.bgeinc.com  
TSP# Registration No. F-01048

**TEXAS**

**PARKS & WILDLIFE**

**DUNDEE FISH HATCHERY**

**WATER REUSE - EFFLUENT PUMP BACK**

TPWD NO. 1110061

DATE: 12-29-2020  
DESIGNED BY: JM  
DRAWN BY: JF  
REVIEWED BY: MK  
REVISION: 2-2021 JM  
ADDITIONAL NO. 1

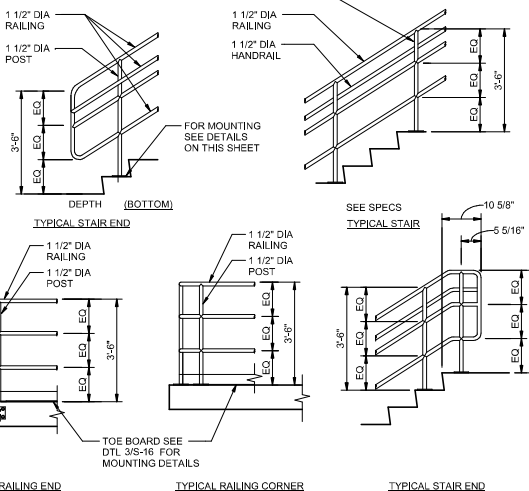
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**TYPICAL STRUCTURAL DETAILS V**

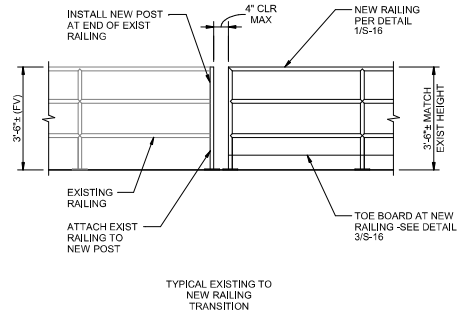
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**S-15**

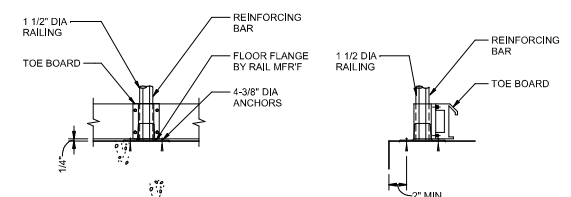
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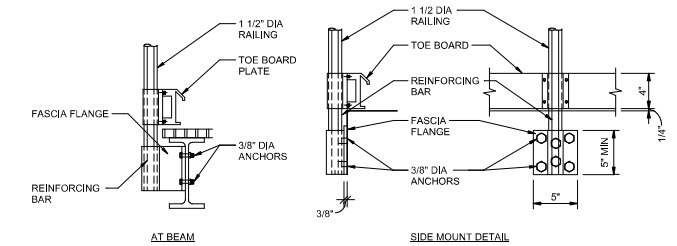
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SCALE: NTS



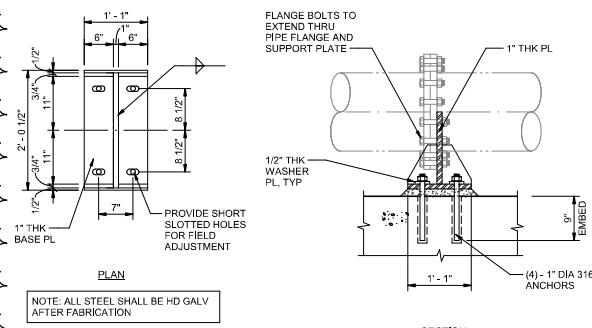
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SCALE: NTS



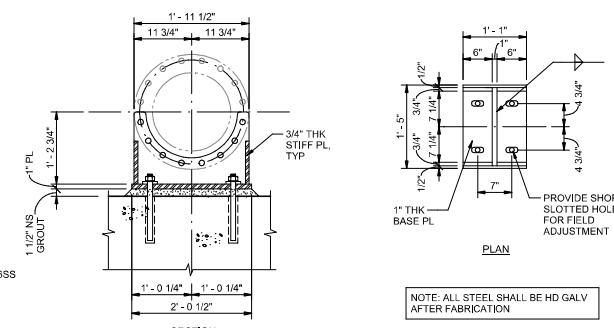
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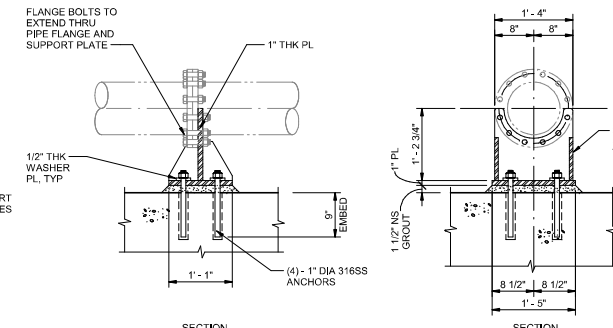
DETAIL  
SCALE: NTS



DETAIL  
SCALE: NTS




DETAIL  
SCALE: NTS



DETAIL  
SCALE: NTS

**DUNDEE FISH HATCHERY**  
**WATER REUSE - EFFLUENT PUMP BACK**  
TPWD No. 1110061R

DATE: 01/05/2021  
DESIGNED BY: OA  
DRAWN BY: BW/LP  
REVIEWED BY: YM  
REVISED: 3-2021  
ADDENDUM NO. 1  OA  
REVISED:  
  
REVISED:

**SHEET TITLE**

VALVE SUPPORT  
STRUCTURAL DETAILS

SHEET NUMBER

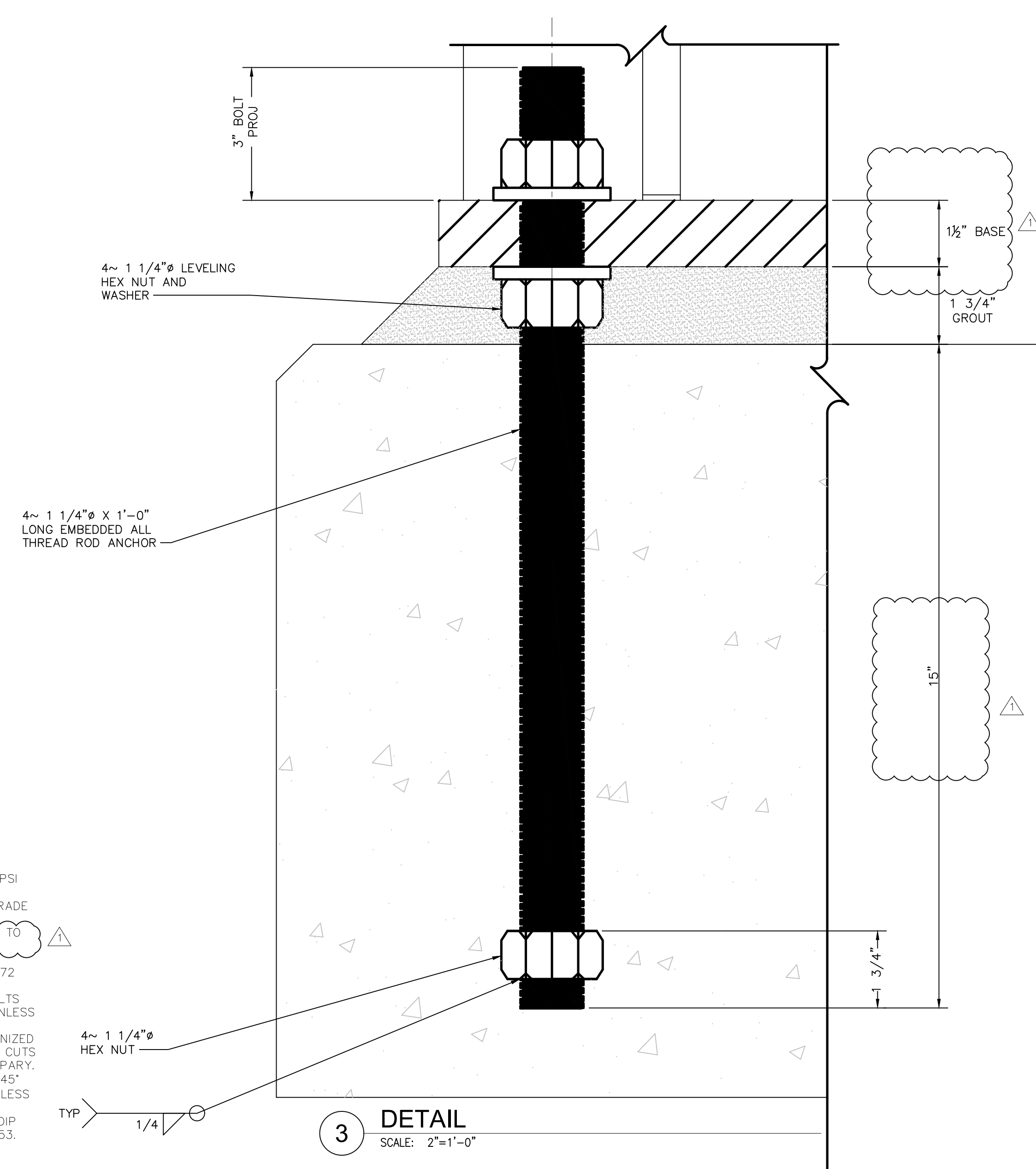
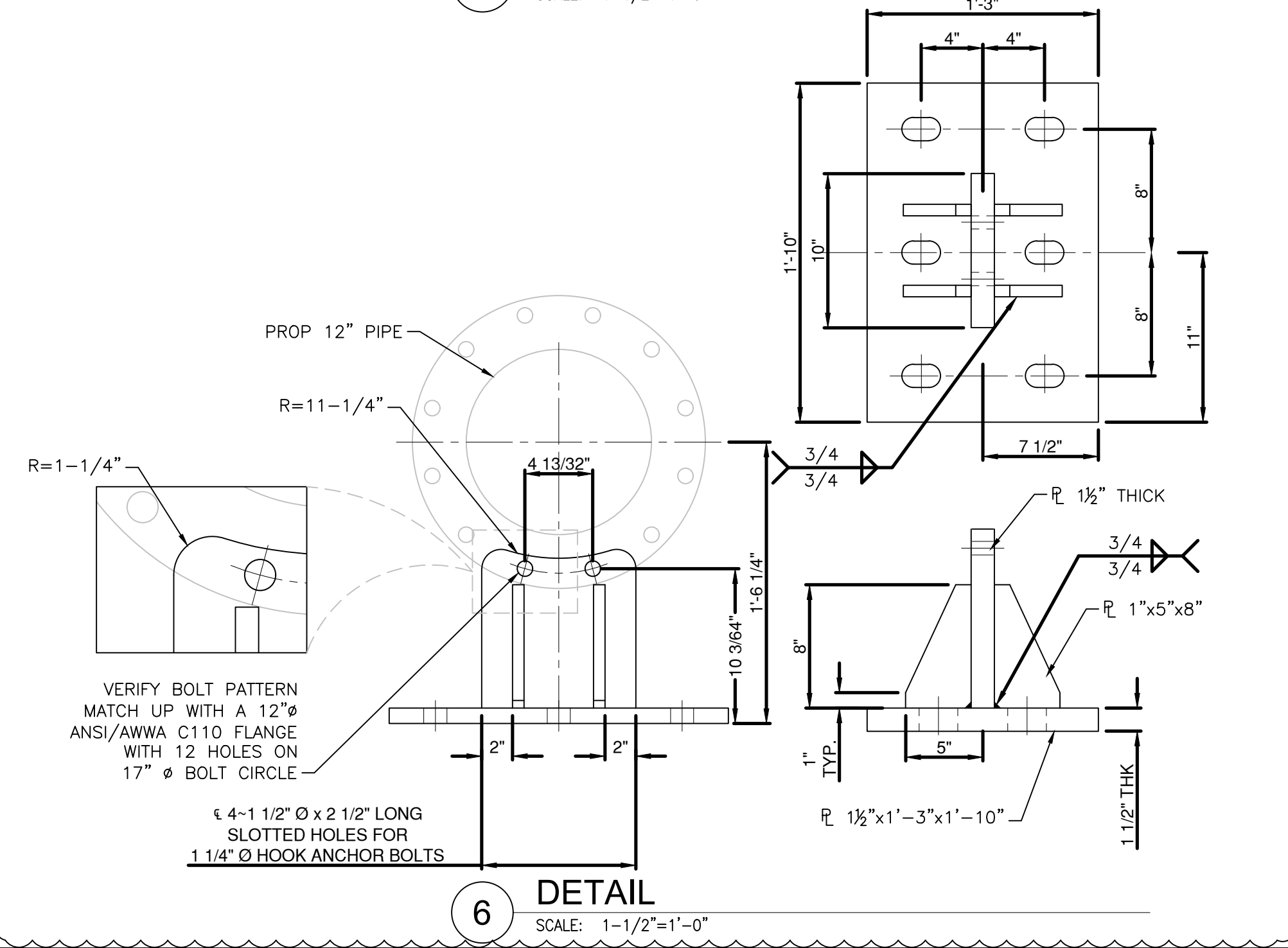
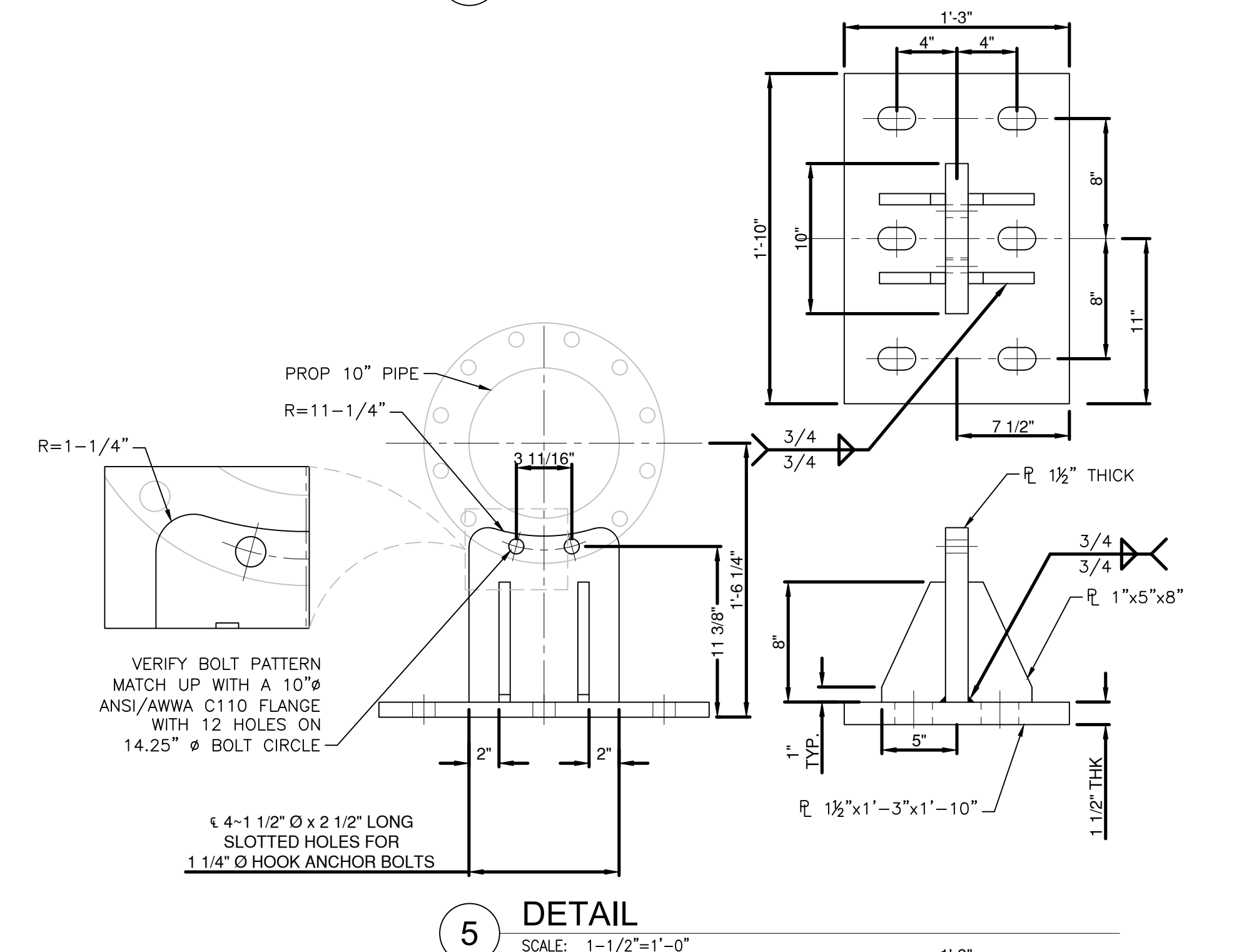
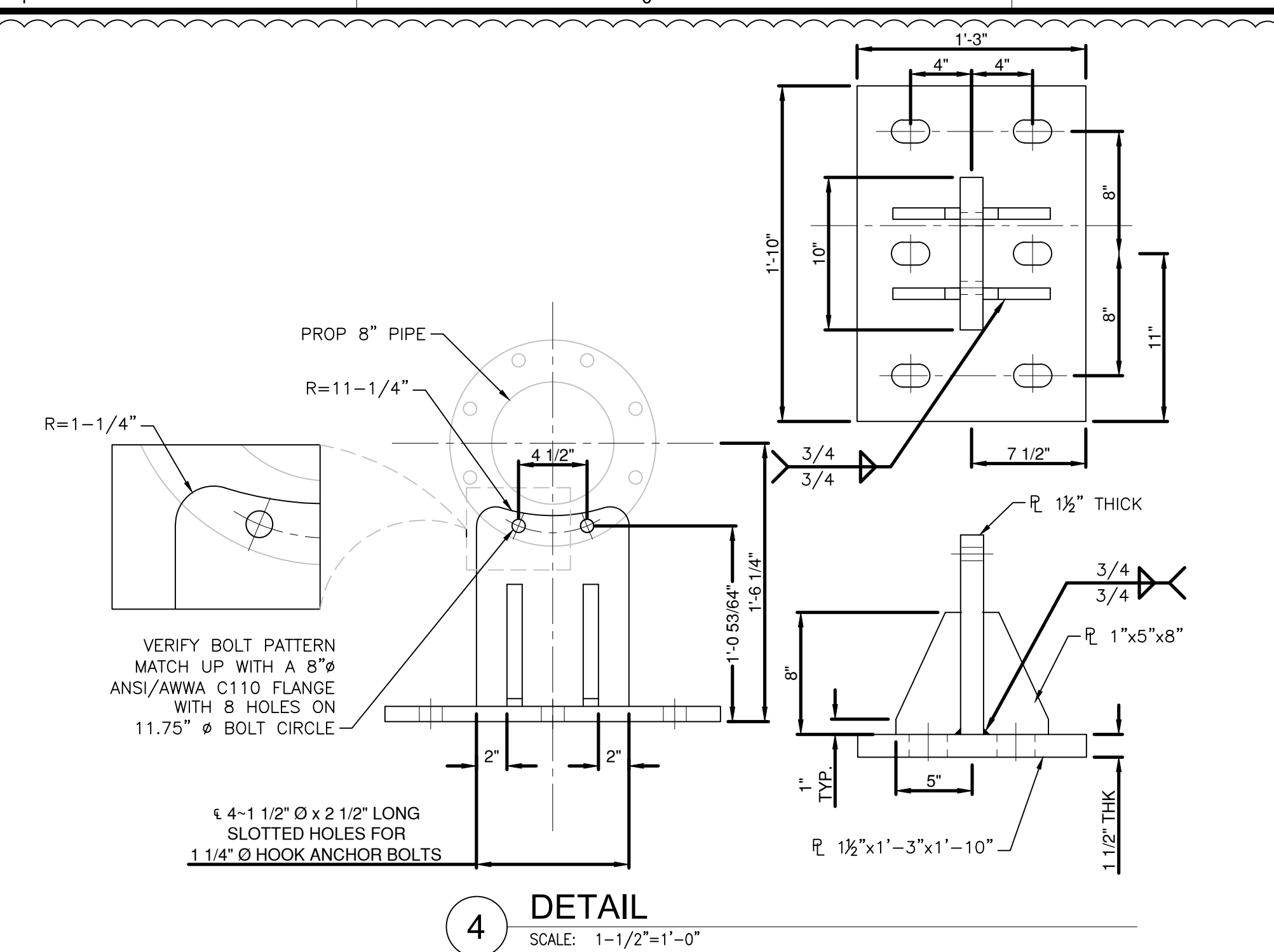
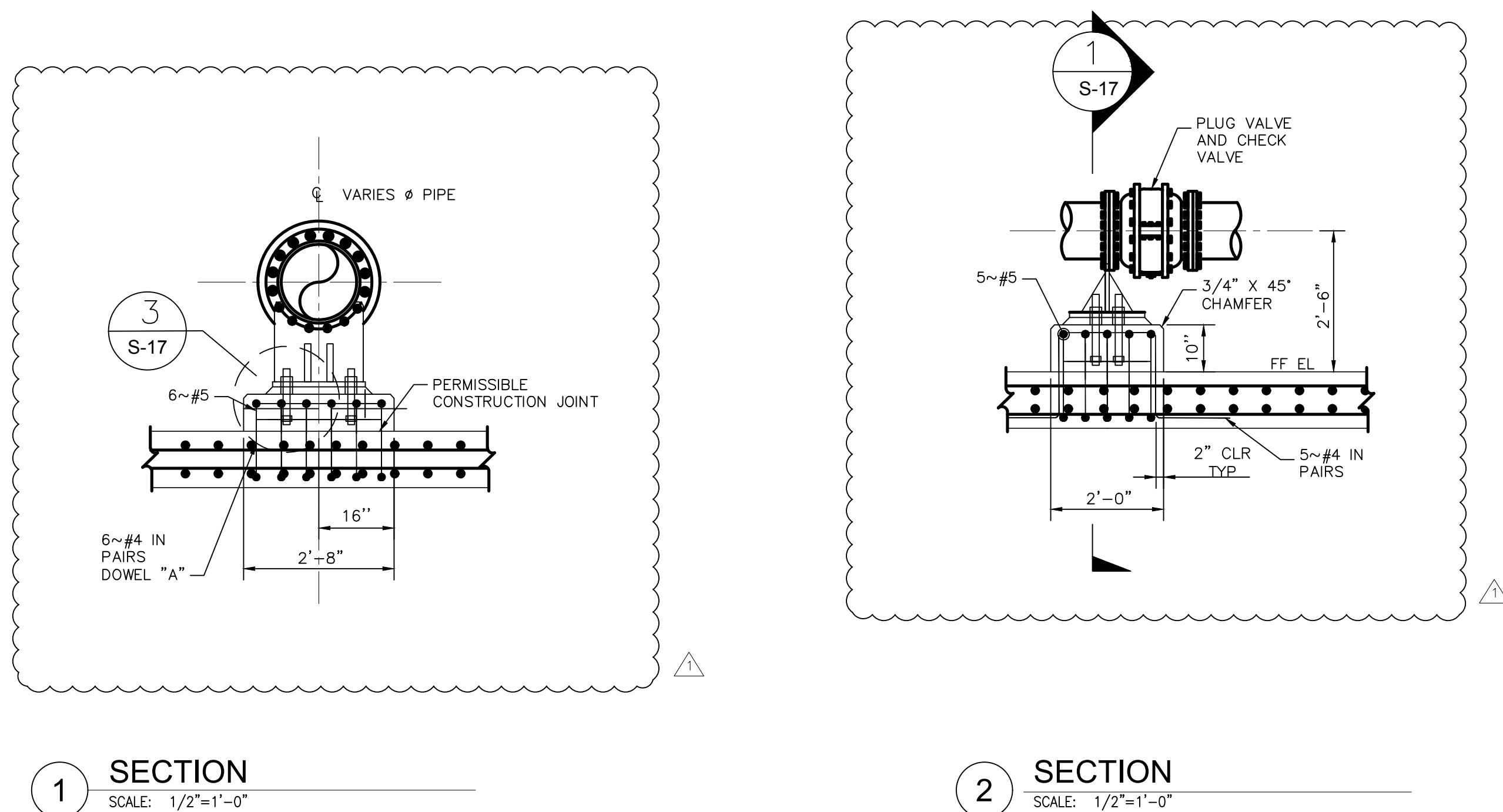
**S-17**

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1110061-S-17



**BGE, Inc.**  
700 North Pearl Street, Suite 2100  
Dallas, TX 75201  
Tel: 469-621-3200 • [www.bgeinc.com](http://www.bgeinc.com)  
TBPE Registration No. F-1046



**NOTE:**

1. ALL CONCRETE SHALL BE  $F'_{cm}=4,000$  PSI MIN.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. ALL STUD ANCHORS SHALL CONFORM TO ASTM F1554 GRADE 55.
4. ALL STRUCTURAL STEEL, INCLUDING PLATES, SHALL CONFORM TO ASTM 572 GRADE 50.
5. ALL BOLTS, NUTS, HOOK ANCHOR BOLTS, AND WASHERS TO BE TYPE 316 STAINLESS STEEL.
6. ALL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. COAT ALL FIELD CUTS WITH AN RICH GOLD GALVANIZING SPARK.
7. CHAMFER ALL EXPOSED EDGES  $3/4" \times 4/8"$ .
8. ALL REBAR CLEARANCE TO BE 3" UNLESS NOTED OTHERWISE.
9. ALL STUD ANCHORS SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153.

TYPE









# OFFICE MEMORANDUM

**Date:** August 7, 2019

## COORDINATION — ROUTING

Div.	Name	Initial	Date
WL	Rick Hanson	RH	08-07-2019

**To:** Todd Engeling  
**From:** Rick Hanson  
**Subject:** Dundee Fish Hatchery Project  
**Re:** Natural Resource Clearance

Remarks:

Return To:

I have reviewed the construction plan for the proposed Dundee Fish Hatchery Pump Back System, for potential impacts to natural resources, including a Texas Natural Diversity Database search and a rare, threatened and endangered species review. Based on the information provided, the Wildlife Habitat Assessment Program offers the following comments and recommendations.

To comply with Chapter 64 of the Parks and Wildlife Code and the Migratory Bird Treaty Act, the Wildlife Habitat Assessment Program recommends excluding vegetation clearing activities during the general bird nesting season, March 15 through September 15, to avoid adverse impacts to birds. If clearing vegetation during the migratory bird nesting season is unavoidable, the Wildlife Habitat Assessment Program recommends surveying the area proposed for disturbance to ensure that no nests with eggs or young will be disturbed by operations. Any vegetation (trees, shrubs, and grasses) or bare ground where occupied nests are located should not be disturbed until the eggs have hatched and the young have fledged.

The state-listed threatened Texas horned lizard can be found in open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees. Suitable habitat exists in portions of the project area and this species has been observed on site. If Texas horned lizards are observed during construction, the Wildlife Habitat Assessment Program recommends allowing them to safely leave the site. During pipeline installation open trenches should be inspected to ensure no Texas horned lizards or other reptiles have been trapped. Disturbed areas within suitable habitat for the Texas horned lizard should be revegetated with site-specific native, patchy vegetation rather than sod-forming grasses.